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MODEL NO WS-133 CONTRACT NO AF04 (647) - 289

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REFERENCES

a) D2-6004-5 Vol. I MIL-I-6051 Test Requirements and Procedure, GTM 004 in Missile Assembly Building

b) MIL-I-6051B Electrical/Electronic System Compatibility and Interference Control Requirements for Aeronautical Weapon Systems and Associated Subsystems

c) D2-3602-2 Vol. I Model Specification for Airborne Vehicle - WS-133A and WS-133A-M Minuteman (S-133-[illegible])

d) D2-3602-2 Vol. II, Deviations and Variations from Specification S-133-120[illegible] for R&D Missiles

e) D2-3602-2 Vol III Addendum IV PCM/FM System - Channel Accuracy GTM 004C; Addendum IV B FM/FM System Linearity - GTM 004C

f) 25-33418 Sheet 1 PCM Telemetry Group Data Chart - GTM 004C - MAB 2

g) 25-33418 Sheet 2 PCM Telemetry Group Data Chart - GTM 004C - MAB 2

h) 25-33418 Sheet 3 PCM Telemetry Supplemental Data Sheets - GTM 004C - MAB 2

i) Minuteman AMR Coordination Bulletin AN-522, dated 15February, 1962, J. L. Melgaard(A/N) to R. F. Person (BATC), Subject: Electromagnetic Interference Experienced on GTM 004C in MAB 1 and 2.

j) D2-[illegible]-004C Volume 2, Minuteman AMR Field Test Report - GTM 004C - MAB 2 Processing (Confidential)

1. OBJECTIVES

1.1 Steady State Compatibility

Determine that the most sensitive outputs of CTM 004C and each TSE subsystem are within the stated limits while CTM 004C and all electrical/electronic test support and facility equipment is energized in a steady state manner.

1.2 Dynamic Compatibility

Determine that the dynamic operations of each Airborne and TSE subsystem do not cause interference in excess of the steady state limits to any other Airborne or TSE Subsystem operated in a steady state mode. Also determine the absence of crosstalk within the airborne data collection system.

1.3 Facility Dynamic Compatibility with Airborne and TSE

Determine that dynamic operation of the facility electrical equipment does not cause interference to the Airborne and Test Support Equipment in excess of the stated limits, the latter being operated in a steady state mode.

2. INTRODUCTION

This test was planned in accordance with paragraph 4.3.1 of MIL-I-6051D. Paragraph 4.3.1 calls for a test on the complete weapon system, in this case, GTM 004C (less re-entry vehicle) and Missile Assembly Building #2.

The test consisted of five parts. The first part consisted of monitoring all sensitive outputs of GTM 004C and the Test Support Equipment with all electrical/electronic equipment and GTM 004C in a fully energized steady state mode. The second part consisted of monitoring all sensitive equipment in the steady state mode while operating all electrically powered equipment one at a time. The next three parts demonstrated the ability to calibrate the telemetry system in an energized environment.

3. TEST ARTICLE CONFIGURATION

GTM 0C4C was electrically complete except for the reentry vehicle which is absent. MAB 2 was in a configuration which would support a PCM missile.

4. ABSTRACT

4.1 General - Below is a brief description of the interference encountered during the MIL-I-6181 test on GTM 004C in May. Complete details on the interference problem can be found in paragraph 8, Test Results, of this test report.

4.2 Steady State Compatibility Test - During the steady state the real time monitor point and the FM/FM playback monitor points failed to show any out-of-tolerance interferences. The PCM/FM playback monitor points which were analyzed using standard oscillograph analysis and computer analysis showed some out-of-tolerance interferences. There were 226 PCM/FM channels analyzed using standard oscillograph analysis. 201 of these channels were analyzed with a computer. The oscillograph analysis showed that a total of 42 channels (18.6% of the total) are out of tolerance due to steady state noise. 17 of these have random transients (one sample drop outs occurring randomly) which do not affect or hide the DC level. The computer analysis showed that 74 channels out of a total of 201 (36.7% of the total) are out of tolerance when the 3 limit is used. If the 2 limit had been used, there would be only 19 channels (9.5% of the total) out of tolerance. One sample drop outs may be the cause of more noise at the 3 than the 2 limit. Because the 2 limit will disregard more of the one sample drop outs which do not degrade the data than the 3 limit it would be more desirable to use the 2 limit.

4.3 Dynamic Test Results - During the Dynamic test the real time monitor points showed that ordnance hazardous current monitors tripped twice during the operation of the instrumentation power transfer switch and once when the 1st stage ignition F/T box was placed in the armed condition. All three hazardous currents were resettable.

The FM/FM playback monitor points failed to show any out-of-tolerance interferences.

The PCM/FM playback monitor points showed the following interferences: 1) A transient occurred on 25 T/M channels and the VSWR monitor failed for .7 seconds when the power transfer switch was activated from ground power to missile power. 2) The steady state noise on P018P and S003X decreased when the channel 4 tone was turned off and increased when the Destruct Receivers were turned on. S003X also had a change in steady state noise when the channel 4 tone was turned on and the Destruct Receiver were turned off. 3) S003E and S035E had DC level shifts when the BTS-106 frequency meters and the VTVM were turned off. There was also another DC level shift on these channels which is uncorrelated. 4) When the NCU Hydraulic System was energized there were 51 additional channels out during the first operational test, 33 during the second operational test and 26 during the Nozzle Step Check. Most of these channels only had 2% noise on them. This noise is not present when operating on battery (or airborne) power.

4.4 BTS-19 and BTS-152 Dynamic Calibration Test - The real time monitor points and the FM/FM playback monitor points failed to show any out-of-tolerance interferences.

The PCM/FM monitor points did show several interferences. 1) S080E and S081E shifted in DC level 15 times during the Section 47 BTS-19 operations and the BTS-152 dynamic operations. Some of the shifts were uncorrelated; therefore, it is possible that some of the shifts which seem to be correlated are not. 2) During the DC simulation sequencer operation A015T had a 6% increase in noise which lasted for 2 seconds. 3) During the BTS-152 Dynamic Operations G032E, H015T, and G041E had many DC level shifts and increase in steady state noise. This was due to the fact that the leads which connect BTS-152 to the transducers are not terminated unless BTS-152 steps on them and a stimulus is sent out. Because the leads are properly terminated when stepped on the noise disappears; therefore, there is no problem during calibration.

5. EQUIPMENT TESTED

The equipment that was tested is listed along with its part number and serial number in Appendix III.

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6. INSTRUMENTATION

The part number and serial number of all test equipment used will be found in Appendix IV.

6.1 Power Supplies - A 36 channel CEC oscillograph was used to monitor the power supplies. The following power supplies were monitored with AC coupling as shown in figure 1: BTS-170 for PCM/FM, BTS-162 for Transducer Excitation, BTS-162 for FM/FM #1, BTS-162 for FM/FM #2, BTS-169 for 1st and 2nd NCU Electronics, BTS-168 for G&C Electronics, BTS-161 for Command Destruct Receiver A, and BTS-161 for Command Destruct Receiver B. The following power supplies were monitored by DC coupling as shown in Figure #2: BTS-165 for 3rd Stage NCU Hydraulics, BTS-164 for Stage 1 & 2 NCU Hydraulics, BTS-168 for C19A, BTS-168 for PSCR, BTS-163 for the T/M Calibration Carts, D29A Resync Power Supply, Ablation Gauge Power Supply, and the Voltage Comparator trip circuit.

6.2 Facilities Power Lines - The Facilities 3-phase 60 cycle power was monitored for transients with Power Line Transient Probes GWF 10192. The Probes are 60cycle rejection filters which allowed frequencies above 200 cycles to be recorded but attenuated the 60 cycles by approximately 50 db. The outputs of the Power Line Transient Probes were recorded on the CEC Oscillograph.

6.3 Events - A dynamic event marker was connected to the CEC oscillograph monitoring the power supplies and to the input of D001E so that the time of all dynamic events except destruct could be recorded on the CEC oscillograph and the Multistylus recorder at the PCM/FM ground station. This gave a time correlation between the two records and the time that each dynamic event occurred.

6.4 Ordnance Safe and Armed Devices - The Ordnance Safe and Armed Devices were replaced by Safe and Armed Test Boxes. The following simulated squibs were then installed in the boxes, two second stage ignition squibs, two 1-2 stage separation squibs, two third stage ignition squibs, two 2-3 stage separation squibs and 4 thrust termination squibs. Since a first stage ignition simulated squib cannot be fired in MAB 1, it was not installed. Since the Model Specification S-1000-133A required that the current through the destruct lines be measured, a 0.2 ohm resistor was used in place of the simulated squib. A six channel oscillograph was then connected across the 0.2 ohm resistors to measure the current which flowed during the destruct test.

6.5 Re-entry Vehicle Simulator - A Re-entry Vehicle Simulator, AVCO SKT-319 was connected to the G & C R/V Interface.

7. TEST PROCEDURE

7.1 General - The test, which was conducted in Missile Assembly Building 2, consisted of the following five parts: 1) Steady State Compatibility Test, 2) Dynamic Compatibility Test, 3) Calibration Steady State Compatibility Test, 4) BTS-152 Ambient Test, and 5) Calibration Dynamic Compatibility Test.

7.2 Steady State Compatibility Test - The Steady State Compatibility Test consisted of monitoring all sensitive outputs of all missile and TSE subsystems, except BTS-19 and BTS-152, for one minute while they were energized and operating in a steady state condition to determine if any out-of-tolerance conditions exist. The center 20 seconds of the T/M data as recorded on the PCM/FM and FM/FM ground stations was analyzed. The PCM/FM data was analyzed using two methods: 1) a computer analysis, and 2) standard oscillograph playback format. The FM/FM data was analyzed using standard oscillograph format only.

7.3 Dynamic Compatibility Test - During Dynamic Compatibility Test all missile and TSE subsystems were energized and operated in a steady state mode. One subsystem was then dynamically operated while all sensitive outputs of the steady state subsystems were monitored to determine if the dynamic subsystem caused interference in excess of the stated limits in D2-6?04-5. The dynamic subsystem was also monitored for proper operation.

7.4 Steady State Calibration Compatibility Test - The Steady State Calibration Compatibility Test is exactly like the Steady State Compatibility Test, with the exception that BTS-19 and BTS-152 would have been connected to the missile. This test was not conducted because Air Force, STL, and Boeing did not consider it to be a necessary part of the test. All problems that would have been uncovered during this test were uncovered during the other parts of the [illegible]-I-6051 test.

7.5 BTS-152 Ambient Test - During this test all subsystems including BTS-19 were to be observed while BTS-152 was dynamically operated in the ambient mode to prove that it is compatible with the other subsystems. The Telemetry data was to be analyzed to prove that the BTS-152 has not disturbed any channels. The digital printer was to be analyzed to prove that BTS-152 is functional. Since STL and Boeing agreed that there is no need to use the BTS-152 in the ambient mode, this test was omitted.

7.6 BTS-19 and BTS-152 Dynamic Calibration Test - During this test BTS-152 and one BTS-19 Calibration Cart were connected to GTM 004C. All airborne and TSM Subsystems, except the G&C Subsystem, were energized and placed in a steady state mode. BTS-19 was then dynamically operated so that it would calibrate the missile. Since only one BTS-19 T/M Calibration Cart was used it was moved from Section 43 to Sections 45 and 47 as required so that all channels calibrated by BTS-19 would be calibrated. After the BTS-19 went through all of its dynamic operations it was then disconnected, and BTS-152 was placed in a calibrate mode and dynamically operated so that the G&C inputs would be calibrated. During the dynamic operations of BTS-19 and BTS-152 all subsystems, except the G&C subsystem, were monitored to determine if any interference exists. The PCM/FM and FM/FM Telemetry Channels were analyzed for crosstalk on unsimulated channels and for noise-free stimulus signals on the simulated channels.

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8. TEST RESULTS

8.1 **General** - The results of this test as to whether an interference problem is within tolerance or not is based on the requirements of Section 1 of D2-6004-5 Volume 1. These requirements satisfy the requirements in D2-3602-2 Volume II, Deviations and Variations from Specification S-133-1000 for R&D missiles. Although there are out of tolerance interferences as described below, some of them are not intolerable. Whether the interference is tolerable or not will depend upon the type, magnitude, cause and effect of the interference. An example of a tolerable interference would be transients which cause excessive PCM bit drop-outs and which can be correlated to manual switching operations. This type of interference is tolerable because of the following two reasons: it will not affect flight data, and the switching operation can be controlled so that it will not occur during the acquisition of PCM/FM Telemetry data. A brief description of the different kinds of monitoring and interferences will be given below so that the discussion of the test results will be more easily understood.

8.1.1 **Monitoring** - There were two types of monitoring during the test, real time and playback. The real time monitoring consists of monitoring all monitor points in MAB 2 and the nixie, digital printer, and multistylus recorder at the PCM/FM Ground Station. Since all channels that were on the multistylus records were also on the playback records the multistylus records were only used to correlate range time with each dynamic event that occurred.

The playback monitoring consisted of monitoring the PCM/FM and FM/FM data which was stripped out on oscillograph records. The FM/FM data is listed as a real time monitor point in the test document but was analyzed as playback data because the data had to be processed to be analyzed.

8.1.2 **Real Time Interference** - Real time interferences are interferences which were observed on the real time monitor points. These interferences are recorded at the time they occurred on supplemental data sheets in Section 2 of D2-6004-5, Volume 1.

8.1.3 **Playback Interferences** - The PCM/FM and FM/FM oscillograph traces were analyzed for the following 4 types of noise:

8.1.3.1 **Steady State Noise** - This type of noise, as seen on trace 6 of plot 1, is a steady noise which makes it almost impossible to determine the exact level of the transducer even though, in most cases, a close approximation is possible. Since the noise causes the trace to fluctuate randomly in magnitude and duration, the only practical way to measure the noise is in peak to peak values. This will give the absolute magnitude of the noise which is the value required in this test.

8.1.3.2 Random Transients - This type of noise, as seen on trace 5 (A038T) of plot 30 is also a steady state noise which does not make it impossible to determine the DC level of the trace. The one sample drop-outs or transients are ignored by a data analysist because they do not reflect the true value of the T/M Channel. When analyzing a trace like this for noise the peak values of the positive and negative transients were recorded. To determine the peak-to-peak noise level of the trace the two values would have to be algebraically subtracted.

8.1.3.3 DC Level Shifts - A DC shift is a change in analog value on analog traces due to the operation of other equipment or equipments. This type of noise is the most serious because approximation of the actual value of the trace cannot be determined using the median value which is used for a trace with steady state noise. Since this type of noise is the most serious it should be fixed if at all possible.

8.1.3.4 Transients - A transient is a disturbance on a T/M channel which is greater than the background noise and lasts for short periods of time, less than 0.5 seconds for the purposes of this report. The transients that are recorded in this report can be caused by several types of disturbances which are:

1) A switching operation in the Missile, TGE, T/M Ground Station and/or T/M Playback Station.

2) Loss of Sync in the missile, ground station and PCM/FM playback station.

3) Bit drop-out in the missile, landlines PCM/FM ground station and PCM/FM playback station.

4) A combination of skew and bit drop-outs on the PCM/FM magnetic tape.

Item 1 above applies to both FM/FM data and PCM/FM data. Items 2, 3, and 4 apply to PCM/FM data only.

The PCM/FM bit drop-out rate that is permissible is one bit in 10^6 bits. Since there are 345.6 K bits every second it is permissible to lose approximately 1 bit every 3 seconds. This can cause one sample transient to occur which have a magnitude of up to 51% if the most significant bit of the 8 bit analog word was lost. Because of this permissible bit drop-out rate it must be realized that during the dynamic testing there are many one sample transients which look like they are correlated with switching operations but are due to random bit drop-outs.

8.2 Steady State Compatibility Test Results

8.2.1 General - The results of the Steady State Compatibility Test will be discussed in two parts, first with respect to the Real Time Monitor Points then with respect to the Playback Monitor Points. The Playback Monitor Points will then be divided into 3 sections which are: 1) FM/FM Monitor Points, 2) PCM/FM Monitor Points, and 3) A comparison between the oscillograph analysis and computer analysis of the PCM/FM Data.

8.2.2 Real Time Monitor Points - During the steady state compatibility test the real time monitor points failed to show that there are any out-of-tolerance interferences present. This was partially due to the fact that FM/FM power supplies had a capacitor (180 μf) from the positive sense lead to static ground. The capacitor reduced the ripple from 900 MV p-p to 47 MV p-p on FM/FM #1 and 200 MV p-p to 50 MV p-p on FM/FM #2. All the other power supplies were within tolerance.

After the MIL-I-6051 test was completed the power supplies were rechecked. The FM/FM fix was removed and a different fix, 100 μf capacitors between the positive sense lead and positive power lead and negative sense lead and negative power lead, was incorporated on the FM/FM supplies. This fix reduced the noise from 200 MV p-p to 100 MV p-p on FM/FM #1 and 220 MV p-p to 105 MV p-p on FM/FM #2. Although the reduction in noise with this fix was not as great as with the first fix, it is a better fix in that it eliminated the AC ground loop which was created by the first fix.

The recheck showed that the PCM/FM (120 MV p-p), Azusa (25 MV p-p), Destruct A (170 MV p-p), and Destruct B (175 MV p-p) power supplies were within tolerance.

The transducer excitation supply had 300 MV of ripple on it. The capacitor fix used on the FM/FM supplies was unsuccessful. Then it was determined that the load was generating the noise and decided that the load should be cleaned up instead of the transducer excitation ground power system. The G&C Electronics supply had 350 MV p-p of noise on the sense leads and 660 MV p-p on the output leads. The capacitor fix was also unsuccessful with this supply. A degenerative feedback circuit was placed in the power supply which eliminated the power supply amplification but did not reduce the noise so that it would be within the tolerance of 250 MV p-p, but did decrease it to 350 MV p-p.

After the above checks were made on the power supplies all fixes were removed and the equipment was restored to its original configuration. The necessary engineering required to bring the power supplies within tolerance with respect to noise will be initiated to permanently install all fixes necessary.

8.2.3 **FM/FM Playback Monitor Points** – The FM/FM Monitor Points failed to show any out-of-tolerance interferences during the Steady State Compatibility Test.

8.2.4 **PCM/FM Playback Monitor Points**

8.2.4.1 **Computer Analysis** – The computer when analyzing test data will disregard a percentage of the samples starting with the sample farthest from the median. The number of samples that are disregarded will depend upon the confidence factor and the limit used. Since the confidence factor is 80% and a constant, the number of disregarded samples will depend upon whether the 3σ, 2σ, or 1σ limit is used.

The table below will show the number of samples that are disregarded using the 80% confidence factor and the 3σ and 2σ limits for three different sample sizes.

Sample Size	Number of Samples on each end	
	3σ	2σ
1600 to 2599	1	32 to 45
2600 to 3399	2	53 to 62
3400 to 4599	3	71 to 88

When using the 3σ limit in conjunction with the confidence factor there must be at least 1600 samples for the computer to analyze before the computer will disregard 1 sample on each end (positive and negative extremes) or .125% of the total samples. If the 2σ limit was used there would be 32 samples disregarded on each end or 4% of the total samples. Because 3σ limit eliminates only 2 or .125% of the samples it is possible that in a sample size of 1600 samples there can be a few one sample drop outs which will not be disregarded by the computer but do not degrade the data an appreciable amount. Therefore it would be better to use the 2σ limit instead of the 3σ limit.

The computer analyzed 201 PCM channels which are listed in Appendix 1. The following results were obtained:

Limit Used	Channels Within Limit	Percent of Total Channels Analyzed By the Computer
3σ	127	63.3
2σ	182	90.6
1σ	196	97.6

There were 5 channels which were not within limits for the 1σ limit. As can be seen there are 55 more channels that would be within tolerance if the 2σ limit were used.

8.2.4.1 (continued)

The reason that more channels were not within the 3σ limit is partially due to the fact that the channels which are sampled at 33 1/3 sample/second did not have any 1 sample drop outs disregarded by the computer. This is because the sample size analyzed was only 663 samples and the computer using the 3σ limit requires a sample size of at least 1600 samples to disregard any of the one sample drop outs that occur. There were 49 of these channels which were out of tolerence, using the 3σ limit. 36 of these were within tolerance using the 2σ limit which allowed some of the one sample drop outs to be disregarded. Therefore it is possible that if a larger sample size had been used for each of the 36 channels (at least 1600), allowing the computer to disregard some of the one sample drop outs, many of the 36 channels which were within tolerance using 2σ limits would be within tolerance using the 3σ limits. The 13 channels which were not within tolerance using the 2σ limits would not be in tolerance using the 3σ limit with a larger sample size.

There were an additional 19 channels which had a sample size of 1600 samples or larger as required by the computer that were within tolerance using the 2σ limit but out of tolerance using the 3σ limit. As stated before, this is due to the fact that additional one sample drop outs that do not degrade the data an appreciable amount are disregarded by the computer using the 2σ limit instead of the 3σ limit. A typical example of this type of channel is A035P on plot 37. As one can see it would be desirable to use the 2σ limit instead of the 3σ limit.

3.2.4.2 Oscillograph Records - There were 226 PCM/FM channels analyzed on 41 oscillograph records or plots. An $8\frac{1}{2}$" X 11" section was taken out of each of these plots and placed in Appendix II. Each trace on the plots is annotated with its measurement code and the peak to peak noise values which were obtained from both manual and computer analysis. This not only gives a comparison between both methods of analysis but also allows one to see the oscillograph traces.

The manual analysis showed that there were 25 channels which had a peak to peak noise level above 1.5% (all values expressed in percentages are in reference to full scale). There are an additional 17 PCM/FM channels which had random transients which were above 1.5% peak. This gave a total of 42 channels which were out of tolerance with respect to the 1.5% peak to peak noise limit. The magnitude of the noise was up to 6% peak to peak for steady state noise and ± 6% peak for the random transient. Examples of the steady state interferences can be seen on plot 2, measurements G073E and G074E. An example of the random transient can be seen on

8.2.4.2 (cont) plot 26 measurements A014T and A016T. As one can see the analog value of A014T would be easy to determine because the random transients (or one sample dropouts) can be disregarded leaving a trace which is almost noise free. The steady state noise which is on channels G07?? and G073E make it a little more difficult to obtain the DC analog value because all samples in the trace vary randomly in magnitude and duration.

There were 11 random transients recorded during the steady state test. Although the transients are random, at two times 2 transients occurred simultaneously and a third time 5 transients occurred simultaneously. Since all systems were in a static condition it is impossible to state what caused them. Some of the transients which occurred simultaneously can be seen on plot 14. These transients like the other transients recorded in the static test are only one sample.

An overall look at the results of the steady state test as to what channels were clean, had noise above 1.5% and had isolated random transients can be seen on the GTM-0042 PCM Telemetry Cross Data Chart, 25-33418 Sheet 1. The Steady State data is listed under Mode A Frame 1. This chart along with 25-33418, SHT3, PCM T/M Supplemental Data Sheets TAB 2 will give a complete record of all noises on the PCM/FM Telemetry System.

8.2.4.3 <u>Computer and Manual Analysis Comparison</u> - There were 226 PCM/FM channels manually analyzed. 201 of these channels were analyzed with a computer. Since the computer was more critical and accurate in its analysis of the data it found a greater number of the computer channels out of tolerance. The manual analysis revealed that there were 42 channels out of a total of 226 or 18.6% of the total out of tolerance. The computer showed that there were 74 channels out of 201 channels or 36.7% of the total out of tolerance.

A comparison between the two methods of analysis on the channels which were analyzed using both methods showed that the computer, using the 3σ limit, found 37 additional channels out of tolerance than were found using oscillograph analysis. Out of the total 37 additional channels 15 of them had a peak-to-peak noise level between 1.51% p-p to 1.59% p-p. The remaining channels fell between 1.6% p-p and 3.3% p-p. If the 2σ limit was used instead of the 3σ limit all but one of the 37 channels would be within tolerance. A representative channel which the computer says is out of tolerance (1.93% peak-to-peak) but manual analysis says is within tolerance is A050T on plot 22. As one can see it would be very easy to determine the DC analog level of the channel. With channels like this it would be desirable to use the 2σ limit instead of the 3σ limit.

8.3 Dynamic Test Results

8.3.1 General - The dynamic test results will be discussed in two parts, first with respect to Real Time Monitor Points and then with respect to the Playback Monitor Points. The Playback Monitor Points were analyzed only using standard oscillograph strip out. The data was not analyzed with a computer because the type of computer program which would be necessary for the analysis required is not available.

8.3.2 Real Time Monitor Points - During the dynamic compatibility test an Ordnance Hazardous Current indication occurred when the power transfer switch was operated from ground power to missile power and missile power to ground power. It also occurred when the 1st stage ignition F/T box was placed in an armed condition. All three hazardous current indications were resettable. These are the only detected interferences to the Test Support Equipment.

8.3.3 FM/FM Playback Monitor Points - The FM/FM Playback Monitor Points failed to show any out of tolerance interferences during the Dynamic Compatibility Test.

8.3.4 PCM/FM Playback Monitor Points - During the dynamic compatibility test the data was analyzed for changes in steady state noise, random transients, correlated transients and DC level shifts. All changes in steady state noise and DC level shifts due to a dynamic operation are listed below. The random transients and part of the correlated transients are not listed below but data on these can be obtained on the GTM 304C PCM Telemetry Gross Data Chart, Sheets 1 and 3. The correlated transients which are not listed are one sample transients in which only one or two, occurring simultaneously, occurred during a dynamic operation. The possibility that these transients are random is much greater than the possibility of their being caused by the switching operation. When three or more transients occurred simultaneously during a switching operation they will be listed below because the possibility of their being caused by the switching operation is much greater than in the case of one or two transients occurring simultaneously.

The PCM/FM Telemetry Interferences are listed below:

1. When the instrumentation power transfer switch was operated from ground power to missile power the VSWR monitor failed for .7 seconds and a transient occurred on 25 transducers.

2. When the channel 4 tone was turned off S003X had a 5% decrease in noise the first time and a 1% decrease the second time. PC18P only had a 8% decrease in noise the first time.

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8.3.4 (continued)

3. There was a 3% DC level shift on S083E and a 1.5% DC level shift on S085E approximately 6 seconds after modulator frequency was turned on and six seconds before the destruct receiver power was turned off.

4. The noise on S003X increased 3% when the modulator frequency 3 (channel 4 tone) was turned on.

5. Turning the Destruct Receivers off decreased the noise on S003X 3%.

6. Turning the BTS-106 VTVM off caused a 6% DC shift on S083E and 1.5% DC shift on S085E.

7. Turning BTS-106 Frequency Meter off caused a DC shift of 2% on S083E and 1.5% on S085E. The two channels were restored to their original level when the frequency meter was turned on.

8. When the Destruct Receivers were turned on the peak-to-peak noise changed 4% p-p on S003X and 8% p-p on P018F.

9. During the G&C operational test and the Nozzle Step Check the noise on several PCM/FM channels increased while the hydraulic pumps were operating. Some of the channels were already out of tolerance but most of the channels were within tolerance before and after the hydraulic pump operation.
Prior to the MIL-I-6051 test it was determined that the noise on the PCM/FM telemetry channels increased to the point where the channels were unusable while the model "D" NCU hydraulic pump motors were operating. A 1000 μf capacitor was then placed across the power leads of the hydraulic pump motors. This fix, used during the MIL-I-6051 test, eliminated the noise on all the PCM/FM telemetry channels except those listed in the table below. A model "E" NCU, which has more RFI fixes than the model "D" NCU, was installed on the first stage engine to find out its effect on the T/M System. The noise that its motors generated was equivalent to the model D NCU with the 1000 μf capacitor fix.

8.3.4 (continued)

The first stage model "D" NCU was also operated on battery power to determine its effect in flight. It was found out that when operating on battery power the PCM/FM telemetry system is not affected by the NCU ~~hydraulic pump motor~~. This shows that although there are some PCM/FM channels out of tolerance while on ground power when the missile is on battery power there is no RFI problem. Since most of the out of tolerance channels have only 2% noise it would be desirable to fix the worst cases, like G007E and G008E with 8% p-p and 4% p-p noise, respectively, and use the other channels as they are since they are usable with 2% steady state noise which is present only while the NCU hydraulic pump motors are running on ground power.

The table below lists all affected channels with the steady state noise that was generated on each by the NCU motors. As one can see the channels which are affected are different in the different tests. The reason for this is unknown.

	Operational Test #1	Operational Test #2	Nozzle Step Check
G006E			2
G007E	8	8	8
G008E	4	4	4
G023E	2		
G024E	2		
G025E	2		
G026E	2		
G027E	2		
G028E	2		2
G029E	2		
G035E	2	4	2
G037E	2	3	2
G040E	2		
G041E	2		
G042E		2	
G058E	2		
G070E		2	
G074E	2		
G080E	2	3	
G081E	2		
G082E	2		
G083E	2	2	
G084E		2	
G085E	2		
G090E			2
G091E	2		← Random Transients
G092E		2	
S013E		2	2
S018E	2	2	
S022E		2	
S080E		4	3
S081E		5	5

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8.3.4
(continued)

	Operational Test #1	Operational Test #2	Nozzle Step Check
S083E		2	
S085E		2	
A002H			3
A071E	2		
A025P	2		
A026P	2	2	
A028P		2	
A029P	2		
A032P	2		
H003P		2	2
H005P		2	2
H007P	2		
H008P	2		
H009P	2		
H010P	2		3
H011P	2	2	4
H012P	2	2	4
H013P	2	2	3
H015P	2	2	2
A001S	2		
A012T	2		
A024T	2		2
A026T	2		3
A027T			
A040T		▷1	3
A045T	2	2	
A046T	2	2	
A047T		from 2% random transients to 2% steady state noise	
A050T	2	2	2
A051T	2	2	2
A058T	2		
A061T			2
A063T	2		3
A090T	2	2	
A199T	2		
A535T	2		
P004X	2	2	
S001X	2	2	2
S013X	2		

▷1 Noise increased from 2% to 3%

8.4 BTS-19 and BTS-152 Dynamic Calibration Test

8.4.1 General - The objectives of the test were to prove that 1) no excessive crosstalk existed between data channels, 2) the calibration equipment injected noise-free stimulus signals, and 3) the calibration equipment did not affect all other subsystems, except the G&C subsystem.

When a BTS-19 calibration cart was connected to the missile, it was discovered that 60 cycle noise was injected on the unsimulated channels connected to the calibration cart. If three Telemetry Calibration Carts would have been used the 60 cycle noise that each would inject in the Telemetry Channels would have covered some of other interferences. When the BTS-19 Calibration Cart steps on to a channel to calibrate it the 60 cycle noise disappears and the calibration stimulus is clean.

Since the interest is only in the simulated channels which are clean during calibration the 60 cycle noise is not a problem during normal calibration, but only when looking for interference problems such as crosstalk. Therefore Boeing and STL agreed that only one telemetry calibration cart instead of three would be connected to the missile for this test. A revision to the BTS-19 has since been made eliminating this interference on the unstimulated channels.
This test, like the other tests, will be discussed in two parts, first with respect to the Real Time Monitor Points, then with respect to the Playback Monitor Points. The Playback Monitor points were analyzed using only standard oscillograph strip out methods because the computer program necessary for the type analysis which is required was not available.

8.4.2 Real Time Monitor Points - The Real Time Monitor Points failed to show any out of tolerance interferences during the BTS-19 and BTS-152 Dynamic Compatibility Test.

8.4.3 FM/FM Playback Monitor Points - The FM/FM Playback Monitor Points failed to show any out of tolerance interferences during the BTS-19 and BTS-152 Dynamic Compatibility Test.

8.4.4 PCM/FM Playback Monitor Points

8.4.4.1 General - During the calibration compatibility test the PCM/FM telemetry data was analysed for the different types of noise as stated in paragraphs 8.1.3 but because of the objectives of the Calibration Dynamic Compatibility Test as stated in 8.4.1, changes in steady state noise and DC level shifts only will be listed below. The reason that steady state noise is not listed is that in a dynamic test of this type only the changes in steady state noise are of interest. The details on steady state noise can be obtained from 25-33418 Sheet 2 - GTM 0040 PCM Gross Telemetry Data

8.4.4.1 (cont) Chart. The transients are not listed because they will not present any calibration problems unless they are present in excessive numbers which may hide the level of the calibration stimulii. In this test all of the calibration stimulii were clean and the transients recorded were on the T/M channels while they were in a steady state condition. The number of transients which occurred on the T/M channels during the Dynamic Calibration Test are recorded on 25-33418 Sheet 2 and the details on each transient can be found on the supplemental data sheets in 25-33418 Sheet 3, PCM Supplemental Data Sheets.

8.4.4.2 BTS-19 Dynamic Operations at Missile Sections 43 and 45 The PCM/FM monitor points failed to show any changes in steady state noise or DC level shift for the Section 43 and Section 45 BTS-19 dynamic operations.

8.4.4.3 BTS-19 Dynamic Operations at Missile Section 47 - The PCM/FM Telemetry interferences which occurred during the Section 47 BTS-19 dynamic operations are listed below.

1) The DC level of S080E and S081E shifted +2% one second after the BTS-19 vibrator supply switch was turned off. The two transducers returned to their original level 7.8 seconds after the switch was turned on.

2) During the operation of the AC Simulation Sequencer A015T had a 6% increase in steady state noise for 2 seconds.

3) During the operation of the DC Simulation Sequencer two DC level shifts occurred on the following two transducers:

   S080E +2% and +1%
   S081E +1% and +2%

4) Turning the DC Simulation Switch off caused the following DC level shifts:

   S080E -4%
   S081E -4%

5) Turning the DC voltage measurements switch on caused the following DC level shifts:

   S080E +3%
   S081E +4%

6) During the operation of the DC voltage measurements sequencer the following DC level shifts occurred:

   S080E -2%
   S081E -2%

7) Operating the AC Transducer Output Sequencer caused S081E to have a +1% DC level shift.

8.4.4.3 (cont)

8) Placing the AC Voltage Measurement switch to the MOM position caused a DC level shift on the following channels:

S080E +1%
S081E +4%

9) During the operation of the AC Voltage Measurement switch the following DC level shifts occurred:

S080E -1%
S081E -2%

10) Switching the AC voltage supply frequency switch from the 100 cps position to the 20 cps position caused the following DC level shifts:

S080E -2%
S081E -3%

11) During the BTS-19 calibration sequence two DC level shifts which can not be correlated with any switching operations were noted on the following transducers:

S080E +2% and -2%
S081E +2% and -4%

Since S080E and S081E shifted its DC analog value even when no dynamic operation was taking place, it is very probable that some of the interferences recorded on these two channels as listed above may be random and are not correlated with the BTS-19 dynamic operations.

8.4.4.4 BTS-152 Dynamic Operations -- The PCM/FM interferences which occurred during the dynamic operations below are listed below.

1) During the BTS-152 Automatic Calibration Sequence three channels shifted their DC level and became noisey. The reason for this is that the leads which connect BTS-152 to the missile transducers are left open in BTS-152 unless BTS-152 is sending out a stimulus. If leads were properly terminated the noise would not be present. Since the leads are properly terminated when BTS-152 is simulating the transducers the noise disappears and a clean stimulus is present. Because the interest is only in the simulated channels, this is not a problem. The three channels which are affected are:

	DC Shift	Steady State Noise Increase
G032E	6	18
H015P	2	6
G041E	2	6

S080E and S081E also had 16 DC level shifts each being approximately 3%.

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8.1.4.4 (cont)

2) Turning the BTS-152 Frequency Meter off caused S080E and S081E to have a DC shift of 3%.

3) Turning the BTS-152 digital printer off caused S080E and S081E to have a DC shift of 3%.

4) An uncorrelated DC shift of 3% also occurred on S080E and S081E. As stated before since S080E and S081E shifted when no dynamic operation was taking place, it is very probable that some of the above interferences recorded above are random and are not due to the BTS-152 dynamic operations.

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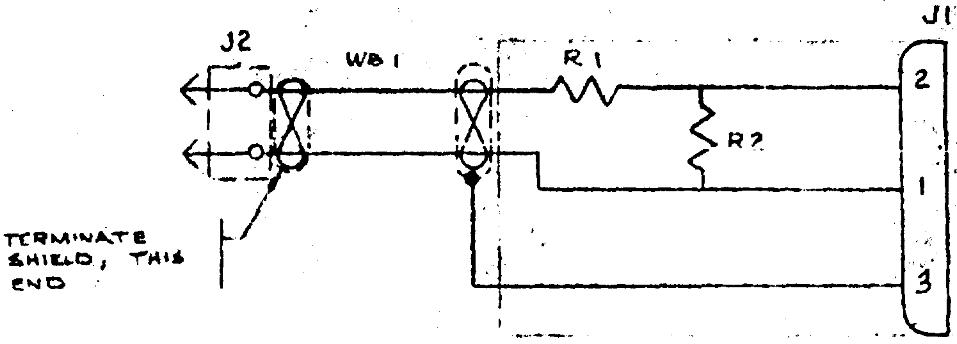
9. CONCLUSIONS

The objectives of this test were to determine if a PCM/FM missile can be processed in MAB 2 and to prove that the PCM/FM missile is free from crosstalk.

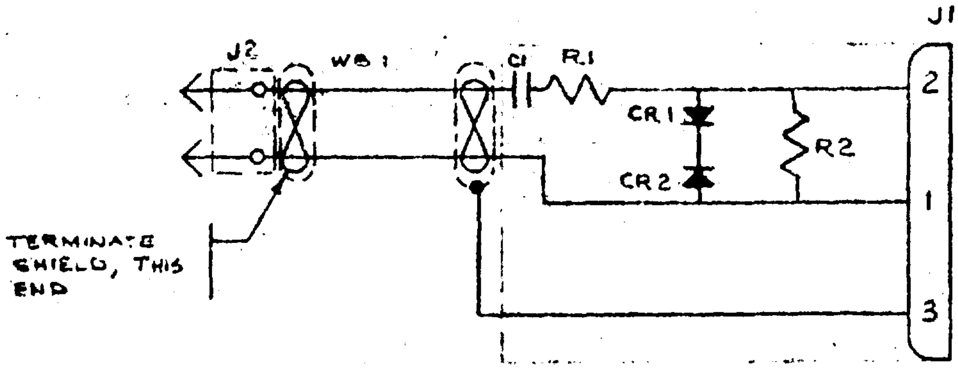
The results of this test have proved that a PCM/FM missile can be processed in MAB 2 successfully. The test results have also showed that the T/M channels are free from crosstalk, except for G080E and G081E which fluctuated frequently during dynamic operations and while all systems were in a static condition. Since they fluctuated while all systems were in a static condition it is possible that most of the other fluctuations which look like they are correlated are random. Also P018P and S003X were affected during the dynamic test but not while the T/M channels were calibrated. This indicates that no crosstalk exists between P018P and S003X and the other T/M channels.

FIGURE -1



REF DESIG.	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
J1	XLR-3-11C	CONNECTOR - PLUG	CANNON ELEC. (OR EQUIV)	
J2	210	BANANA PLUG - DBL	H.H. SMITH (OR EQUIV)	
R1	MS35044-121	RESISTOR - 6.8K, 1W	(RC32GF682J, OR EQUIV)	
R2	MS35044-84	RESISTOR - 200Ω, 1W	(RC32GF201J, OR EQUIV)	
WB1	—	2 COND SHIELDED WIRE	BMS 13-60, TYPE III, CLASS B	#16 x 20 FT

FIGURE -2



REF DESIG.	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
J1	XLR-3-11C	CONNECTOR - PLUG	CANNON ELEC (OR EQUIV)	
J2	210	BANANA PLUG - DBL	H.H. SMITH (OR EQUIV)	
R1	MS35044-57	RESISTOR - 15Ω, 1W	(RC32GF150J, OR EQUIV)	
R2	MS35044-84	RESISTOR - 200Ω, 1W	(RC32GF201J, OR EQUIV)	
CR1, CR2	10EZ5.6T10	ZENER DIODE	INTERNATIONAL RESIST. CORP (OR EQUIV)	
WB1	—	2 COND SHIELDED WIRE	BMS 13-50, TYPE III, CLASS B	#16 x 20 FT
C1	113D686G-7050M1	CAPACITOR - N.P. 60μfd	SPRAGUE ELECT (OR EQUIV)	

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APPENDIX I

COMPUTER ANALYSIS OF PCM/FM DATA

TEST TYPE MAB 2 STATIC COMPATIBILITY TEST GTM 0040

PERIOD OF ANALYSIS 20 HRS 10 MIN 0 SEC TO 20 HRS 10 MIN 20 SEC

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE REGION 99.73 PCT	TOLERANCE REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
G013D	1959	52.00	54.80	2.80	3.75 2.22	10.00	0.95 -0.58	0.20 -0.20	0.15 -0.15	54.80	0.13
G014D	1959	51.00	55.20	4.20	4.79 3.62	10.00	0.59 -0.58	0.23 -0.22	-.15 -0.15	55.20	0.14
G015D	1959	52.00	54.04	2.04	2.99 1.80	10.00	0.95 -0.24	0.54 -0.23	0.22 -0.17	54.07	0.20
G016D	1959	51.00	54.00	3.00	3.98 2.70	10.00	0.98 -0.30	0.20 -0.20	0.15 -0.15	54.01	0.13
G017D	1959	51.50	53.20	1.70	2.69 1.50	10.00	0.98 -0.20	0.30 -0.20	0.15 -0.15	53.21	0.14
G018D	1959	52.00	54.80	2.80	3.79 2.60	10.00	0.98 -0.20	0.22 -0.20	0.15 -0.15	54.81	0.14
G019D	1959	52.00	54.42	2.42	3.38 2.20	10.00	0.97 -0.22	0.52 -0.21	0.16 -0.16	54.43	0.17
G020D	1959	52.00	55.21	3.21	3.80 2.64	10.00	0.59 -0.57	0.42 -0.20	0.15 -0.15	55.21	0.14
G021D	1959	52.00	55.60	3.60	4.55 3.02	10.00	0.95 -0.58	0.20 -0.20	0.15 -0.15	55.60	0.13
G022D	1959	52.00	55.63	3.63	4.59 3.4[illegible]	10.00	0.95 -0.23	0.54 -0.22	0.18 -0.17	55.66	0.19

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
G023D	1959	51.50	54.39	2.89	3.49 2.31	10.00	0.59 -0.59	0.20 -0.39	0.15 -0.15	54.39	0.14
G024D	1959	51.00	53.61	2.61	3.59 2.15	10.00	0.98 -0.46	0.51 -0.20	0.15 -0.15	53.62	0.16
D001E	653	3.00	0.38	-2.62	-1.70 -3.19	5.00	0.92 -0.57	0.37 -0.52	0.17 -0.17	0.37	0.18
G006E	653	7.00	0.40	-6.60	-5.70 -7.18	10.00	0.90 -0.58	0.46 -0.44	0.16 -0.16	0.40	0.17
G008E	653	78.00	67.20	-10.80	-10.60 -11.00	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	67.20	0.12
G023E	653	82.00	81.54	-0.46	0.18 -1.00	10.00	0.65 -0.53	0.34 -0.51	0.20 -0.32	81.51	0.22
G024E	653	48.00	46.81	-1.19	-0.23 -1.40	10.00	0.95 -0.21	0.53 -0.21	0.16 -0.15	46.83	0.16
G025E	653	50.50	49.20	-1.30	-0.73 -1.78	10.00	0.57 -0.48	0.20 -0.20	0.15 -0.15	49.20	0.13
G026E	653	52.00	52.04	0.04	0.93 -0.80	10.00	0.89 -0.84	0.54 -0.60	0.35 -0.26	52.05	0.28
G027E	653	56.00	55.21	-0.79	0.10 -1.25	10.00	0.89 -0.46	0.42 -0.20	0.15 -0.15	55.21	0.14

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
					VALUE	TOL.					
G028E	653	49.00	49.52	0.52	1.18 0.00	10.00	0.66 -0.52	0.36 -0.50	0.21 -0.33	59.59	0.23
G029E	653	23.00	22.40	-0.60	-0.03 -0.80	10.00	0.57 -0.20	0.20 -0.20	0.15 -0.15	22.40	0.12
G032E	653	17.50	17.00	-0.50	1.00 -1.95	10.00	1.50 -1.45	1.12 -1.13	0.62 -0.68	16.97	0.56
G033E	653	1.00	0.77	-0.23	0.37 -0.79	10.00	0.60 -0.56	0.23 -0.52	0.17 -0.17	0.75	0.18
G037E	653	72.50	61.60	-10.90	-10.70 -11.10	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	61.60	0.12
G039E	653	51.00	51.18	0.18	0.40 -0.50	10.00	0.22 -0.68	0.21 -0.51	0.16 -0.16	51.16	0.17
G040E	653	51.00	50.27	-0.73	0.35 -1.20	10.00	1.38 -0.47	0.33 -0.45	0.25 -0.33	50.25	0.24
G041E	653	40.50	40.03	-0.47	0.47 -0.70	10.00	0.94 -0.23	0.54 -0.22	0.17 -0.17	40.06	0.19
G042E	653	50.00	49.85	-0.15	0.57 -0.40	10.00	0.71 -0.45	0.34 -0.44	0.26 -0.32	49.83	0.23
G043E	1959	51.00	51.16	0.16	0.78 -0.40	10.00	0.62 -0.56	0.24 -0.52	0.18 -0.24	51.13	0.19

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
G044E	1959	53.00	52.40	-0.60	0.39 -0.80	10.00	0.98 -0.20	0.19 -0.19	0.15 -0.25	52.41	0.14
G045E	1959	57.00	53.21	-3.79	-2.82 -4.28	10.00	0.97 -0.49	0.36 -0.20	0.15 -0.15	53.21	0.14
G059E	3918	46.00	45.09	-0.91	0.20 -2.46	10.00	1.11 -1.55	0.94 -1.03	0.39 -0.51	45.05	0.46
G060E	3918	46.00	44.65	-1.35	0.98 -2.58	10.00	2.25 -1.23	1.36 -0.79	0.60 -0.37	44.73	0.50
G061E	3918	49.50	49.62	0.12	1.05 -0.48	10.00	0.93 -0.60	0.52 -0.22	0.16 -0.16	49.64	0.18
G062E	3918	49.00	49.59	0.59	1.54 0.00	10.00	0.95 -0.58	0.52 -0.52	0.18 -0.18	49.58	0.22
G063E	3918	50.00	49.94	-0.06	0.57 -0.60	10.00	0.63 -0.54	0.25 -0.51	0.18 -0.23	49.91	0.21
G070E	3918	50.00	49.59	-0.41	0.57 -1.00	10.00	0.98 -0.59	0.58 -0.56	0.35 -0.35	49.59	0.30
G071E	3918	50.00	49.99	-0.01	0.90 -0.60	10.00	0.91 -0.58	0.31 -0.45	0.15 -0.15	49.97	0.17
G072B	3918	50.00	49.93	-0.07	[illegible] -0.60	10.00	0.66 -0.59	0.26 -0.50	0.19 -0.30	49.90	0.22
G058E	3918	56.00	55.68	-0.32	0.97 -1.38	10.00	1.29 -0.06	0.88 -0.68	0.54 -0.30	55.74	0.41

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
G073E	3918	52.00	50.99	-1.01	0.91 -3.60	10.00	1.93 -2.59	1.27 -1.95	0.52 -1.18	50.73	0.23
G074E	3918	49.00	58.35	-0.65	0.39 -1.72	10.00	1.04 -1.07	0.64 -0.53	0.36 -0.37	48.36	0.33
G075E	3918	50.00	49.82	-0.18	1.37 -1.77	10.00	1.56 -2.59	1.10 -1.14	0.55 -0.65	49.78	0.55
G081E	653	50.00	49.99	-0.01	0.90 -0.58	10.00	0.91 -0.57	0.31 -0.44	0.16 -0.15	49.99	0.16
G082E	653	50.00	50.26	0.26	1.30 -0.20	10.00	1.04 -0.46	0.33 -0.45	0.25 -0.33	50.24	0.24
G083E	653	55.00	54.79	-0.21	0.70 -0.78	10.00	0.91 -0.57	0.20 -0.40	0.15 -0.15	54.79	0.14
G084E	653	52.00	51.60	-0.40	0.50 -0.70	10.00	0.90 -0.30	0.25 -0.20	0.15 +0.15	51.61	0.13
G087E	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
G088E	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
G090E	653	8.00	0.40	-7.60	-6.70 -8.15	10.00	9.90 -0.55	0.39 -0.22	0.15 -0.15	0.40	0.14

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
G092E	653	77.00	66.00	-11.00	-10.80 -11.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	66.00	0.12
I004E	653	0.	0.00	0.00	0.57 -0.20	1.00	0.57 -0.20	0.20 -0.19	0.15 -0.15	0.00	0.12
I005E	653	100.00	100.40	0.40	1.35 0.20	1.00	0.95 -0.20	0.20 -0.20	0.15 -0.15	100.41	0.13
I006E	653	0.	0.	0.	0.20 -0.20	1.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
I007E	653	100.00	100.02	0.02	0.93 -0.20	1.00	0.91 -0.22	0.52 -0.21	0.16 -0.16	100.04	0.17
I008E	653	1.00	0.80	-0.20	0.73 -0.71	1.00	0.93 -0.51	0.20 -0.20	0.15 -0.15	0.80	0.13
I009E	653	102.00	101.60	-0.40	0.19 -0.80	1.00	0.58 -0.40	0.32 -0.20	0.15 -0.15	101.61	0.13
I010E	653	0.	21.60	21.60	21.80 21.40	1.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	21.60	0.12
I012E	653	0.	0.24	0.24	0.97 -0.20	1.00	0.73 -0.43	0.36 -0.42	0.27 -0.31	0.22	0.23
I013E	653	100.00	99.27	-0.73	0.15 -1.00	1.00	0.88 -0.77	0.51 -0.36	0.32 -0.19	99.30	0.21

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
I014E	653	0.	0.	0.	0.20 -0.20	1.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
I015E	653	100.00	100.04	0.04	0.93 -0.59	1.00	0.90 -0.63	0.54 -0.54	0.30 -0.20	100.06	0.24
I016E	653	1.50	0.33	-1.17	-0.52 -1.70	1.00	0.65 -0.52	0.27 -0.50	0.20 -0.33	0.29	0.22
I017E	653	100.00	100.00	0.00	0.97 -0.30	1.00	0.97 -0.30	0.20 -0.20	0.15 -0.15	100.01	0.14
I018E	653	0.	0.36	0.36	0.98 -0.19	1.00	0.62 -0.56	0.29 -0.32	0.18 -0.25	0.34	0.20
I019E	653	100.00	99.99	-0.01	0.93 -1.73	1.00	0.95 -1.72	0.21 -0.84	0.16 -0.16	99.96	0.25
I020E	653	0.	0.85	0.85	1.78 1.60	1.00	0.93 -0.25	0.63 -1.24	0.39 -0.18	0.39	0.22
I021E	653	99.00	100.81	1.81	3.19 1.26	1.00	1.38 -0.55	1.19 -0.21	0.16 -0.16	100.86	0.28
I012E	653	91.00	90.67	-0.33	0.70 -0.20	10.00	1.03 -0.47	0.32 -0.46	0.24 -0.33	90.65	0.23
I013E	653	84.50	91.09	6.59	7.40 6.10	10.00	1.01 -0.49	0.31 -0.47	0.23 -0.34	91.06	0.23

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
S018E	653	88.00	88.73	0.78	1.77 0.21	10.00	0.99 -0.57	0.22 -0.51	0.16 -0.16	88.77	0.18
S021E	653	77.00	76.81	-0.19	0.70 -0.40	10.00	0.89 -0.21	0.46 -0.20	0.15 -0.15	76.82	0.14
S022E	653	75.00	78.00	3.00	3.96 2.80	10.00	0.96 -0.20	0.20 -0.20	0.15 -0.15	78.01	0.14
S080E	653	35.00	45.60	10.60	10.80 10.40	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	45.60	0.12
S081E	653	82.00	71.20	10.80	-10.60 -11.00	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	71.20	0.12
S082E	653	42.00	43.22	1.22	2.16 0.72	10.00	0.94 -0.50	0.53 -0.21	0.16 -0.16	43.23	0.17
S083E	653	89.50	84.17	-5.33	-4.50 -5.70	10.00	0.83 -0.36	0.80 -0.35	0.55 -0.26	84.26	0.23
S084E	653	1.00	0.81	-0.19	0.76 -0.72	10.00	0.95 -0.53	0.47 -0.26	0.15 -0.15	0.81	0.15
S085E	653	36.00	37.50	1.50	2.50 0.40	10.00	1.00 -1.10	0.30 -0.82	0.23 -0.41	37.43	0.29
S086E	653	57.00	54.72	-2.28	-0.07 -5.50	10.00	2.21 -3.22	1.68 -2.47	0.39 -1.10	[illegible]	0.95

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A001H	653	2.00	0.	-2.00	-1.80 -2.20	2.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
A002H	653	3.50	2.05	-1.45	-0.15 -1.70	2.00	1.30 -0.25	0.53 -0.24	0.29 -0.18	2.09	0.22
A003H	653	1.00	1.63	0.63	1.55 0.07	2.00	0.92 -0.56	0.54 -0.23	0.17 -0.17	1.65	0.19
A022H	653	0.	0.	0.	0.20 -0.20	5.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
A023H	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12
A024H	653	1.00	0.43	-0.57	[illegible] -1.16	10.00	0.57 -0.59	0.53 -0.30	0.22 -0.18	0.45	0.20
A025H	653	2.00	1.19	-0.81	0.13 -1.39	2.00	0.95 -0.58	0.43 -0.51	0.16 -0.16	1.18	0.18
A026H	653	0.	1.24	1.24	2.16 1.00	2.00	0.92 -0.24	0.54 -0.23	0.23 -0.17	1.27	0.19
A027H	653	3.00	2.45	-0.55	1.10 -1.80	2.00	1.65 -1.26	0.72 -0.45	0.31 -0.19	2.48	0.26
A028H	653	2.00	2.40	0.40	1.37 -0.23	2.00	0.96 -0.54	0.43 -0.20	0.15 -0.15	2.41	0.15

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
AC29H	653	2.00	1.19	-0.81	0.15 -1.39	2.00	0.96 -0.58	0.21 -0.48	0.16 -0.16	1.18	0.16
AC71H	653	3.00	2.41	-0.59	0.37 -0.80	2.00	0.96 -0.21	0.61 -0.20	0.15 -0.15	2.42	0.15
AC13P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12
AC14P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12
AC21P	653	94.00	98.40	4.40	5.36 4.00	10.00	0.96 -0.40	0.20 -0.20	0.15 -0.15	98.41	0.14
AC22P	653	97.00	95.65	-1.35	-0.44 -1.80	10.00	0.91 -0.45	0.53 -0.24	0.27 -0.13	95.68	0.20
AC24I	653	95.00	98.72	3.72	4.40 3.20	10.00	0.67 -0.52	0.59 -0.53	0.24 -0.35	98.71	0.26
AC23P	653	97.00	95.60	-1.40	-0.31 -1.77	10.00	0.59 -0.58	0.40 -0.39	0.16 -0.16	95.60	0.10
AC29P	653	96.00	96.00	0.00	0.55 -0.70	10.00	0.55 -0.70	0.20 -0.19	0.15 -0.15	96.01	0.12
AC30P	653	97.50	97.20	-0.30	0.66 -0.60	10.00	0.96 -0.30	0.27 -0.20	0.15 -0.15	97.21	0.14

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A031P	653	90.00	94.81	4.81	6.10 4.24	10.00	1.29 -0.57	0.53 -0.31	0.16 -0.16	94.83	0.18
A032P	653	95.00	95.26	0.26	1.17 -0.36	10.00	0.91 -0.61	0.53 -0.33	0.31 -0.19	95.29	0.22
A033P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12
A034P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12
A035P	1959	49.00	48.00	-1.00	-0.01 -1.95	10.00	0.99 -0.95	0.35 -0.26	0.15 -0.15	48.00	0.16
A036P	15019	16.00	14.80	-1.20	-0.34 -1.78	5.00	0.86 -0.58	0.20 -0.27	0.14 -0.14	14.80	0.15
A037P	15672	15.00	14.14	-0.86	-0.03 -1.56	5.00	0.83 -0.69	0.45 -0.33	0.32 -0.24	14.16	0.24
A039P	15672	24.00	25.59	1.59	2.15 0.62	10.00	0.56 -0.97	0.20 -0.57	0.15 -0.15	25.57	0.18
A040P	15672	23.00	23.46	0.46	1.19 -0.28	10.00	0.73 -0.74	0.33 -0.44	0.24 -0.32	23.44	0.24
H001P	1959	7.00	0.35	-6.65	-6.01 -7.20	8.00	0.64 -0.55	0.24 -0.52	0.18 -0.27	0.33	0.20

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
H003P	1959	45.00	34.00	-11.00	-10.30 -11.20	3.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	34.00	0.12
H004P	1959	43.00	32.00	-11.00	-10.80 -11.20	8.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	32.00	0.12
H005P	1306	45.00	34.00	-11.00	-10.80 -11.20	9.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	34.00	0.12
H006P	1959	46.00	35.20	-10.80	-10.60 -11.00	5.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	35.20	0.12
H015P	1959	72.50	61.60	-10.90	-10.70 -11.10	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	61.60	0.12
P015P	1959	2.00	2.38	0.38	0.99 -0.20	2.50	0.41 -0.47	0.20 -0.51	0.16 -0.16	2.36	0.18
P016P	1959	2.50	3.59	1.09	1.69 0.50	3.50	0.60 -0.58	0.21 -0.49	0.16 -0.16	3.57	0.16
P013P	1959	3.00	3.29	0.29	3.59 -3.20	4.50	3.30 -3.49	2.64 -3.43	0.87 -2.17	3.08	1.45
A001S	3918	100.00	99.27	-0.73	0.19 -1.00	5.00	0.91 -0.27	0.51 -0.26	0.31 -0.19	99.32	0.22
A002S	3918	5.00	4.66	-0.34	0.63 -1.18	5.00	0.97 -0.84	0.33 -0.46	0.24 -0.33	4.63	0.25

MEAS. NAME	SAMPLE SIZE	EXP. OUTPUT VALUES	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A003S	3918	100.00	99.50	-0.50	0.20 -1.45	5.00	0.70 -0.95	0.52 -0.43	0.23 -0.33	99.47	0.25
A004S	3918	5.00	4.53	-0.47	0.35 -1.16	5.00	0.82 -0.69	0.46 -0.32	0.32 -0.23	4.55	0.24
A005S	3918	41.50	41.60	0.10	0.90 -0.10	5.00	0.80 -0.20	0.22 -0.20	0.14 -0.14	41.61	0.13
A006S	3918	44.50	45.54	1.04	2.03 0.16	5.00	0.98 -0.39	0.51 -0.52	0.20 -0.30	45.52	0.24
A007S	3918	48.00	47.94	-0.06	0.59 -1.35	5.00	0.65 -1.29	0.26 -0.77	0.19 -0.32	47.89	0.36
A008S	3918	42.00	41.60	-0.40	0.17 -0.94	5.00	0.57 -0.54	0.19 -0.19	0.14 -0.14	41.60	0.13
A009S	15672	62.00	61.20	-0.80	0.10 -1.39	5.00	0.90 -0.59	0.48 -0.45	0.16 -0.16	61.20	0.18
A010S	15672	69.50	68.39	-1.11	-0.24 -1.70	5.00	0.87 -0.58	0.32 -0.49	0.16 -0.16	68.38	0.18
A011S	15019	70.50	72.07	1.57	2.45 0.94	5.00	0.87 -0.64	0.50 -0.27	0.30 -0.19	72.11	0.23
A012S	15019	70.00	68.51	-1.49	-0.64 -1.30	5.00	0.85 -0.31	0.48 -0.29	0.32 -0.21	68.54	0.23

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A006T	653	10.00	12.51	2.51	4.93 3.10	[illegible]	2.43 -2.41	0.75 -0.62	0.36 -0.25	10.51	0.35
A008T	653	11.00	12.64	1.64	2.78 3.55	6.00	1.14 -1.09	0.72 -0.43	0.29 -0.32	12.64	0.29
A009T	653	11.00	11.60	[illegible]	1.97 -0.50	6.00	1.37 -1.10	0.58 -0.54	0.17 -0.17	11.61	0.24
A010T	653	11.00	11.99	0.99	1.09 -0.10	6.00	1.00 -1.09	0.71 -0.55	0.36 -0.30	11.99	0.28
A011T	653	11.00	12.49	1.49	[illegible] -0.50	4.00	2.46 -1.99	0.71 -0.63	0.36 [illegible]	12.52	0.34
A012T	653	11.00	13.00	2.00	3.90 [illegible]	4.00	1.90 -1.70	0.55 -0.42	0.30 -0.30	13.0[illegible]	0.29
A013T	653	9.50	11.01	1.51	3.00 -0.75	4.00	1.49 -2.26	0.70 -1.40	0.29 -0.65	10.82	0.46
A014T	653	11.50	12.00	0.50	7.00 [illegible]	4.00	6.50 -5.67	0.90 -2.40	[illegible] [illegible]	11.95	0.69
A015T	653	9.00	12.88	3.88	[illegible] [illegible]	[illegible]	1.22 -0.59	[illegible] -0.28	0.35 -0.21	12.92	0.24
A016T	653	10.00	10.42	0.42	3.70 -3.50	4.00	3.28 -3.32	1.53 -1.71	1.28 -0.19	10.42	0.56

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REVISED

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A017T	653	11.00	11.28	0.28	1.19 0.00	4.00	0.91 -0.28	0.70 -0.27	0.35 -0.20	11.33	0.24
A024T	653	8.50	8.85	0.35	1.60 -0.58	6.00	1.25 -0.93	0.80 -0.24	0.31 -0.18	8.89	0.25
A026T	653	11.50	10.42	-1.09	0.60 -2.70	4.00	1.69 -1.61	0.74 -0.26	0.16 -0.16	10.42	0.21
A027T	653	11.00	10.67	-0.33	0.40 -1.30	6.00	0.73 -0.97	0.69 -0.46	0.38 -0.34	10.69	0.31
A028T	653	10.00	13.03	3.03	7.73 -0.70	4.00	4.70 -5.73	1.29 -0.78	0.44 -0.34	13.06	0.63
A029T	653	10.00	12.56	2.56	6.33 -0.70	4.00	2.77 -3.26	1.11 -0.73	0.34 -0.29	12.58	0.43
A030T	653	12.00	1.20	-10.80	-10.60 -11.[illegible]	8.00	[illegible] -0.20	0.19 -0.19	0.15 -0.14	1.20	0.12
A031T	653	13.00	23.60	10.60	10.80 10.40	8.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	23.60	0.12
A035T	653	3.00	2.49	-0.51	0.39 -1.10	2.00	0.89 -0.59	0.63 -0.39	0.35 -0.22	2.53	0.24
A037T	653	2.00	2.41	0.41	[illegible].37 0.80	2.00	0.96 -0.29	0.44 -0.2[illegible]	0.15 -0.15	2.41	0.15

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
AC38T	653	12.00	11.51	-0.49	1.75 -2.40	4.00	2.24 -1.91	0.78 -0.58	0.23 -0.35	11.49	0.33
AC39T	653	12.00	11.62	-0.38	1.35 -1.33	8.00	1.73 -0.95	0.68 -0.22	0.17 -0.17	11.65	0.24
AC40T	653	12.00	11.62	-0.38	0.90 -1.60	8.00	1.28 -1.22	0.57 -0.37	0.17 -0.17	11.63	0.22
AC41T	653	12.00	11.38	-0.62	0.58 -2.08	8.00	1.20 -1.46	0.75 -0.41	0.32 -0.38	11.39	0.29
AC42T	653	10.00	10.74	0.74	2.13 -0.45	8.00	1.39 -1.19	0.64 -0.53	0.22 -0.34	10.73	0.28
AC43T	653	12.00	12.48	0.48	2.93 -2.39	8.00	2.46 -2.73	0.72 -0.66	0.37 -0.29	12.49	0.42
AC44T	653	3.00	2.65	-0.35	0.38 -0.85	2.00	0.73 -0.45	0.35 -0.43	0.26 -0.32	2.63	0.24
AC45T	653	4.00	2.39	-1.61	-0.63 -2.18	2.00	0.97 -0.57	0.33 -0.44	0.15 -0.15	2.39	0.16
AC46T	653	3.00	1.96	-1.04	-0.43 -1.59	2.00	0.61 -0.56	0.24 -0.32	0.18 -0.24	1.94	0.19
AC47T	653	[illegible]	2.41	2.41	3.37 1.92	2.00	0.77 -0.49	0.29 -0.20	0.19 -0.15	2.41	[illegible]

3-30-4-2.

REVISED ________

J3 4288 2000 (WAS BAC 4111D)

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
AC48T	653	12.00	12.61	0.61	4.90 -4.80	8.00	4.29 -5.41	1.18 -1.41	0.33 -0.32	12.62	0.66
AC49T	653	12.00	12.89	0.89	4.10 -1.50	6.00	3.21 -2.39	0.90 -0.68	0.43 -0.25	12.94	0.40
AC50T	653	13.00	12.53	-0.47	0.76 -1.17	8.00	1.23 -0.70	0.47 -0.52	0.34 -0.25	12.55	0.26
AC51T	653	14.00	14.31	0.31	1.35 -1.20	6.00	1.04 -1.51	0.28 -0.73	0.21 -0.36	14.27	0.26
AC52T	653	1.00	2.28	1.28	1.98 0.80	1.50	0.69 -0.48	0.31 -0.47	0.24 -0.34	2.36	0.23
AC53T	653	3.00	2.52	-0.48	0.39 -0.90	1.50	0.87 -0.42	0.65 -0.31	0.35 -0.23	2.56	0.25
AC54T	653	0.	0.98	0.88	1.76 0.60	1.50	0.88 -0.28	0.50 -0.27	0.34 -0.21	0.92	0.22
AC55T	653	2.00	1.90	-0.10	0.57 -0.60	1.50	0.67 -0.50	0.30 -0.48	0.22 -0.34	1.87	0.23
AC56T	653	2.00	2.03	0.03	1.30 -0.77	1.50	1.27 -0.73	0.56 -0.23	0.22 -0.17	2.06	0.21
[illegible]	653	3.00	2.44	-0.56	0.35 -0.90	1.50	0.91 -0.34	0.33 -0.24	0.26 -0.19	2.47	[illegible]

3-30-62

MEAS NAME	SAMPLE SIZE	EXT. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A058T	653	1.00	3.83	2.83	3.59 2.40	5.00	0.76 -0.43	0.53 -0.41	0.28 -0.31	3.82	0.25
A059T	653	69.50	69.56	0.06	1.00 -0.30	10.00	0.94 -0.55	0.24 -0.52	0.18 -0.26	69.53	0.20
A060T	653	50.00	43.59	1.41	-0.62 -1.80	10.00	0.78 -0.39	0.40 -0.38	0.30 -0.28	43.60	0.24
A061T	653	13.50	24.00	10.50	10.70 10.30	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	24.00	0.12
A062T	653	3.50	0.56	-2.94	-2.14 -3.30	10.00	0.30 -0.35	0.43 -0.34	0.32 -0.26	0.58	0.23
A064T	653	83.00	72.00	11.00	-11.80 -11.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	72.00	0.12
A089T	653	12.00	12.83	0.83	4.10 -2.30	4.00	3.27 -3.13	1.61 -1.78	0.32 -0.20	12.86	0.44
A090T	653	11.00	10.95	-0.95	-0.00 -1.51	8.00	0.93 -0.57	0.54 -0.35	0.31 -0.19	10.79	0.22
A091T	653	12.00	10.87	-1.13	1.76 -2.70	6.00	2.88 -1.57	1.10 -0.50	0.34 -0.20	10.92	0.35
A094T	653	0.[illegible]	0.[illegible]	[illegible]	0.20 -0.20	6.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.[illegible]	0.12

3-30-62

REVISED

U3 4288 2000 (WAS BAC 4131D)

MEAS NAMES	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A095T	653	12.00	12.42	0.42	1.72 -0.30	6.00	1.33 -0.72	0.56 -0.49	0.18 -0.13	12.44	0.23
A196T	653	2.00	2.42	0.49	1.37 0.10	8.00	0.88 -0.39	0.50 -0.28	0.34 -0.21	2.53	0.23
A198T	653	3.00	2.83	-0.17	0.75 -0.74	1.50	0.92 -0.57	0.54 -0.23	0.22 -0.17	2.86	0.20
A199T	653	3.00	2.01	-0.99	-0.33 -1.45	1.50	0.96 -0.46	0.51 -0.20	0.15 -0.15	2.02	0.16
A200T	653	2.00	2.40	0.40	2.55 -1.65	6.00	2.15 -2.05	0.74 -0.51	0.15 -0.15	2.40	0.28
A503T	653	12.00	12.81	0.81	2.50 -0.70	6.00	1.69 -1.51	0.77 -0.59	0.39 -0.37	12.82	0.33
A533T	653	10.00	12.47	2.47	5.30 -0.30	6.00	2.83 -2.77	0.76 -0.60	0.35 -0.21	12.49	0.35
A534T	653	2.00	2.42	0.42	1.38 0.20	2.00	0.96 -0.22	0.56 -0.21	0.16 -0.16	2.44	0.18
A535T	653	13.00	13.37	0.37	1.95 -1.40	[illegible]	1.58 -1.77	0.62 -0.75	0.33 -0.35	13.35	0.35
A536T	653	3.00	2.52	-0.48	0.37 -0.80	2.00	0.85 -0.32	0.47 -0.31	0.34 -0.23	2.56	0.23

3-30-62

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY VALUE	ACCURACY TOL.	TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
A537T	653	10.00	10.62	2.62	4.50 1.30	6.00	1.88 -1.32	0.94 -0.42	0.30 -0.31	12.62	0.31
P005X	653	1.00	2.05	1.05	1.97 0.30	4.00	0.92 -0.25	0.53 -0.25	0.33 -0.18	2.09	0.21
P006X	653	1.00	2.40	1.40	2.30 0.83	4.00	0.90 -1.57	0.20 -0.33	0.15 -0.15	2.39	0.14
P007X	653	3.00	2.80	-0.20	0.39 -0.76	4.00	0.59 -1.56	0.38 -0.29	0.15 -0.15	2.80	0.15
P008X	653	1.00	1.66	0.66	1.77 0.15	4.00	0.90 -0.51	0.52 -0.20	0.32 -0.19	1.70	0.22
P009X	653	3.00	2.57	-0.43	0.37 -1.80	4.00	0.79 -0.37	0.42 -0.36	0.31 -0.27	2.59	0.24
S002X	653	12.00	12.30	0.30	1.37 0.29	4.00	0.37 -0.51	0.20 -0.20	0.15 -0.15	12.30	0.13
S003X	1959	11.00	11.06	0.06	1.93 -1.58	4.00	1.37 -1.63	1.09 -1.25	0.71 -1.01	10.97	0.74
S013X	15672	0.	0.94	0.94	2.59 -0.20	4.00	1.66 -1.14	1.01 -1.05	0.67 -0.33	1.01	0.53
S014X	15672	0.	4.14	[illegible]	[illegible]	6.00	7.24 -4.33	5.60 -4.09	1.38 -3.30	3.91	2.67

APPENDIX II

PCM/FM OSCILLOGRAPH PLOTS

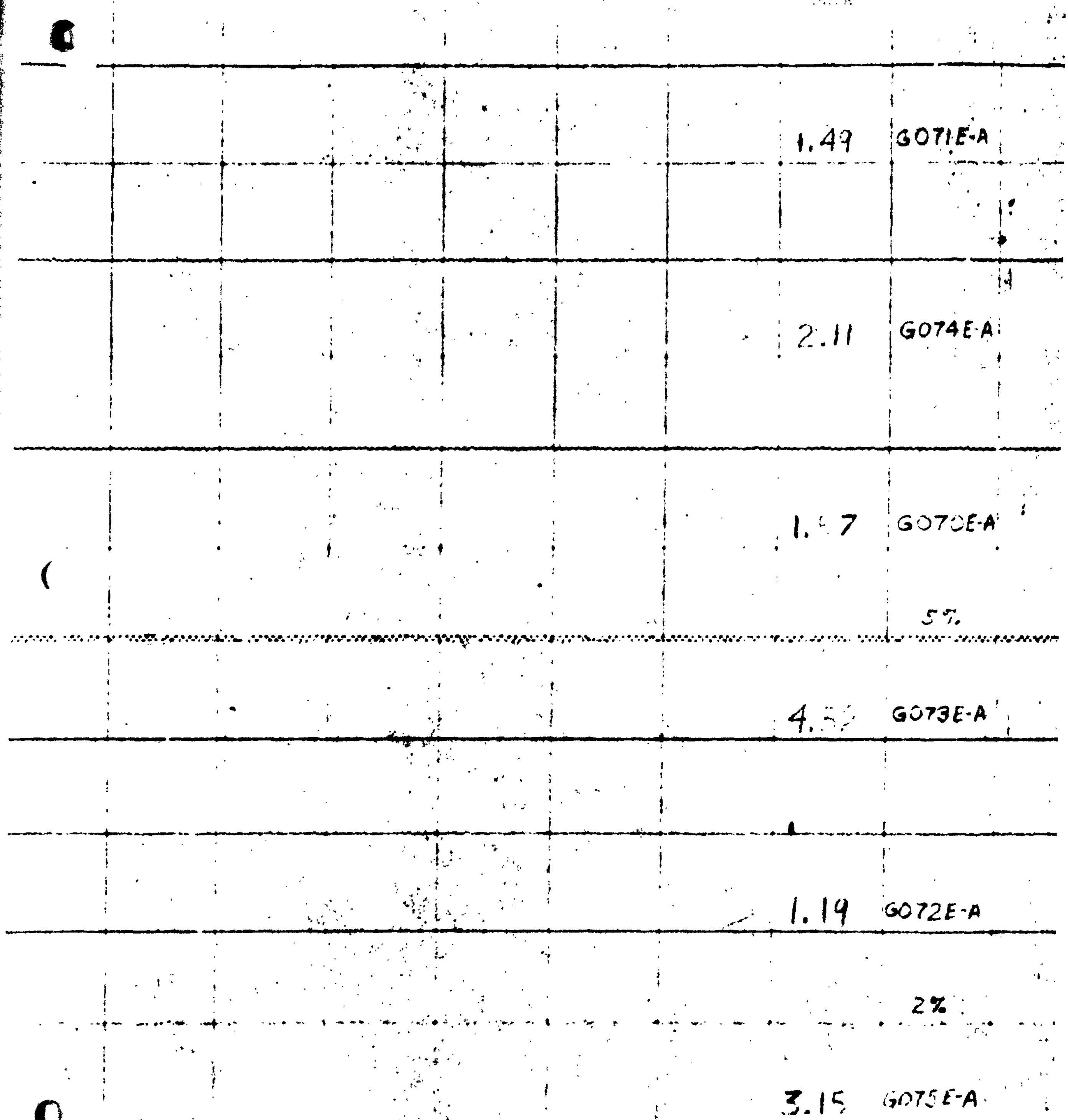
The 41 oscillograph plots which follow are annotated with the following information:

1) The computer analysis of the steady state noise using the 3σ limit is listed under the column marked "Computer Data".

2) To the right of the column labeled "Computer Data" the plots are identified with the plot number, the T/M Channel Code, and the peak-to-peak noise on the trace that was measured during the manual analysis. If the T/M channel is within tolerance (below 1.5% p-p) there will be no value listed.

COMPUTER DATA	
1.53	G061E-A
	2%
2.35	G058E-A
1.55	G062E-A
	2%
	G059E-A
1.[illegible]	G063E-A
	4%
3.[illegible]	G060E-A

PLOT # 1



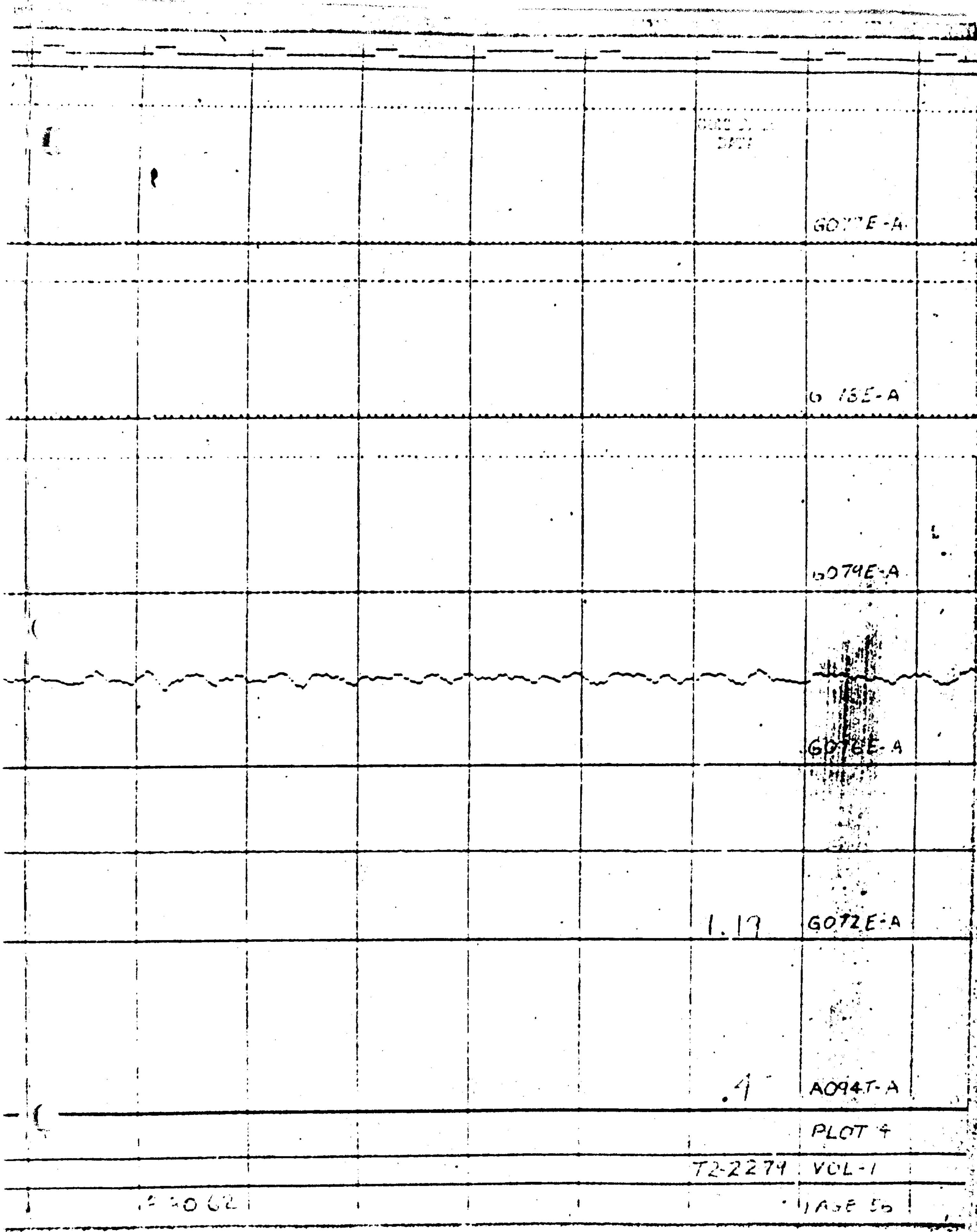
PLOT 2

T2 2279 VOL-1

PAGE 54

2-30 62

							[illegible]		
							1.1[illegible]	G043E-A	
							1.4[illegible]	[illegible]E A	
							1.46	G045E-A	
							1.[illegible]	G07[illegible]E-A	
							1.1[illegible]	G044E A	
							1.[illegible]	G072E A	



G074E-A
G076E-A
1.19
G072E-A
.4
A094T-A
PLOT 4
T2-2279
VOL-1

							COMPUTED DATA		
							1.17	G014D-A	
							1.2?	G016D-A	
								G0[illegible]-A	
							1.55?	G013D-A	
							1.49?	G006EA	
							1.17	H001P-C	
								ROT 5	

							COMPUTER DATA	
							1.14	G018D-A
							1.16	G020D-A
							1.17	G019D-A
							1.1[illegible]	G017D-A
								G007E-C
								H002P-B

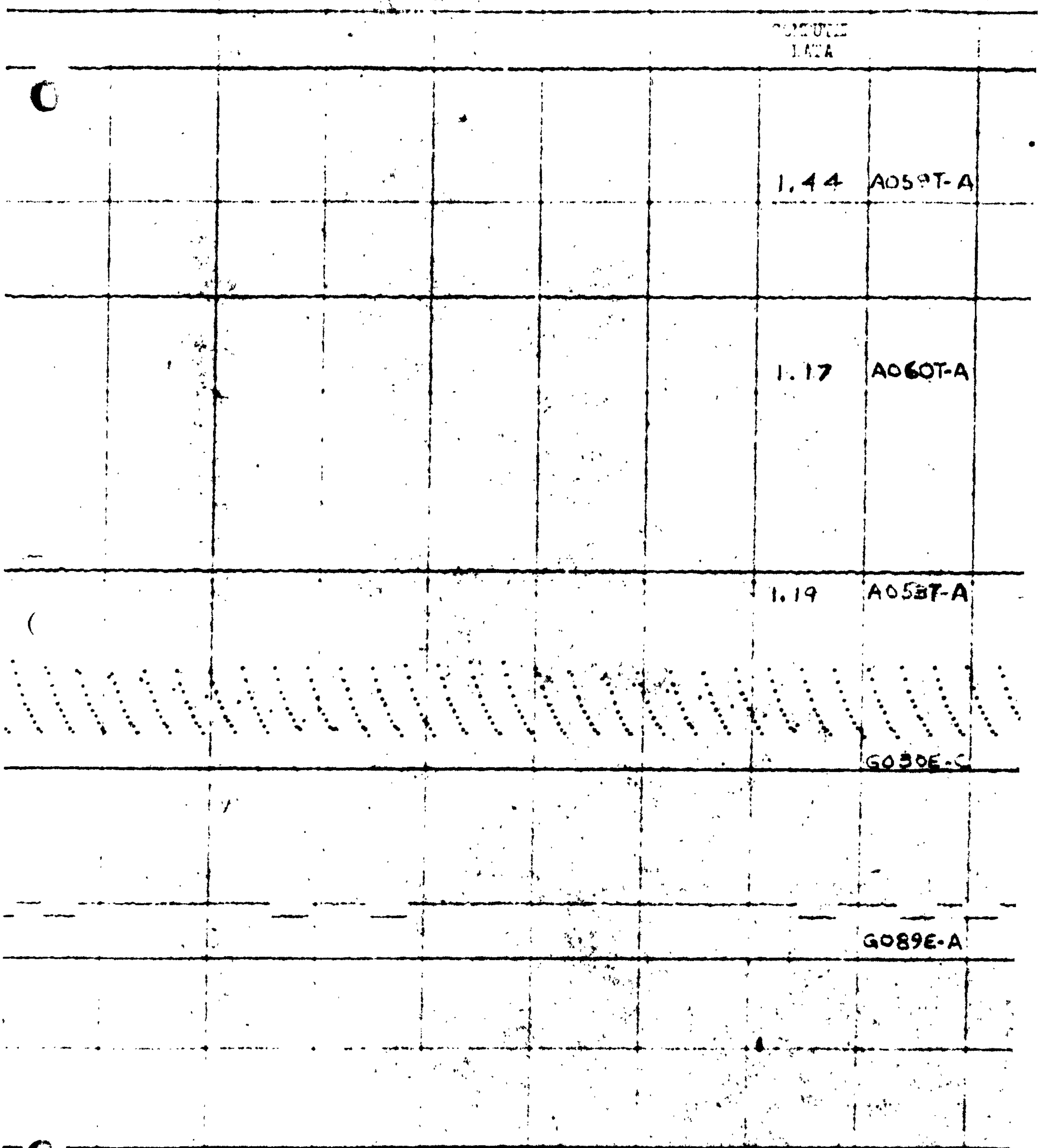
PLOT 6

? 9C-.2 T2-2279 VOL 1

COMPUTER DATA	
1.19	G022D-A
1.44	G024D-A
1.19	G023D-A
1.53	G021D-A
0.40	G003E-A
0.4	H015P-B

PLOT 7

[illegible] 72-2279 VOL I



PLOT 8

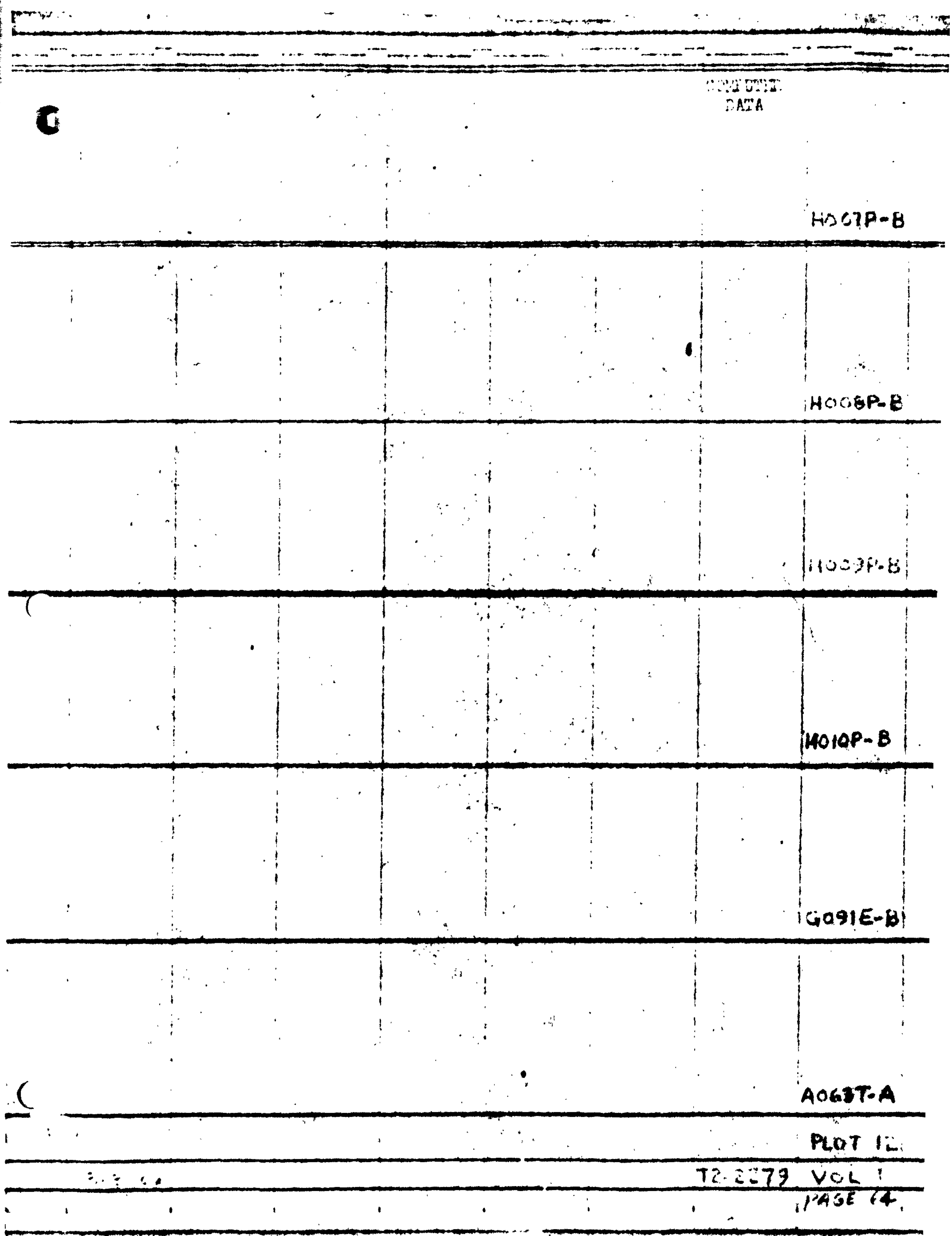
							COMPUTER DATA		
							1.12	G023E-D	
							1.73	G026E-C	
							1.16	G034ED	
							0.77	G029E-C	
							0.4	G088E-A	
							0.4	G097E-A	

PLOT [illegible]

							COMPUTER DATA		
							1.16	G042E-C	
								G080E-C	
							1.4[illegible]	G081E-C	
							1.50	G0[illegible]E-C	
							1.4[illegible]	G083E-C	
							1.20	G0[illegible]E-C	
								PLOT 10	

							COMPUTING DATA	
							[illegible]	H003P-C
							0.4	H004P-C
							0.4	H005P-C
							0.4	H006P-C
							1.45	G090E-B
							1.15	A062T-A
								PLOT 11

T2 2279 VOL I

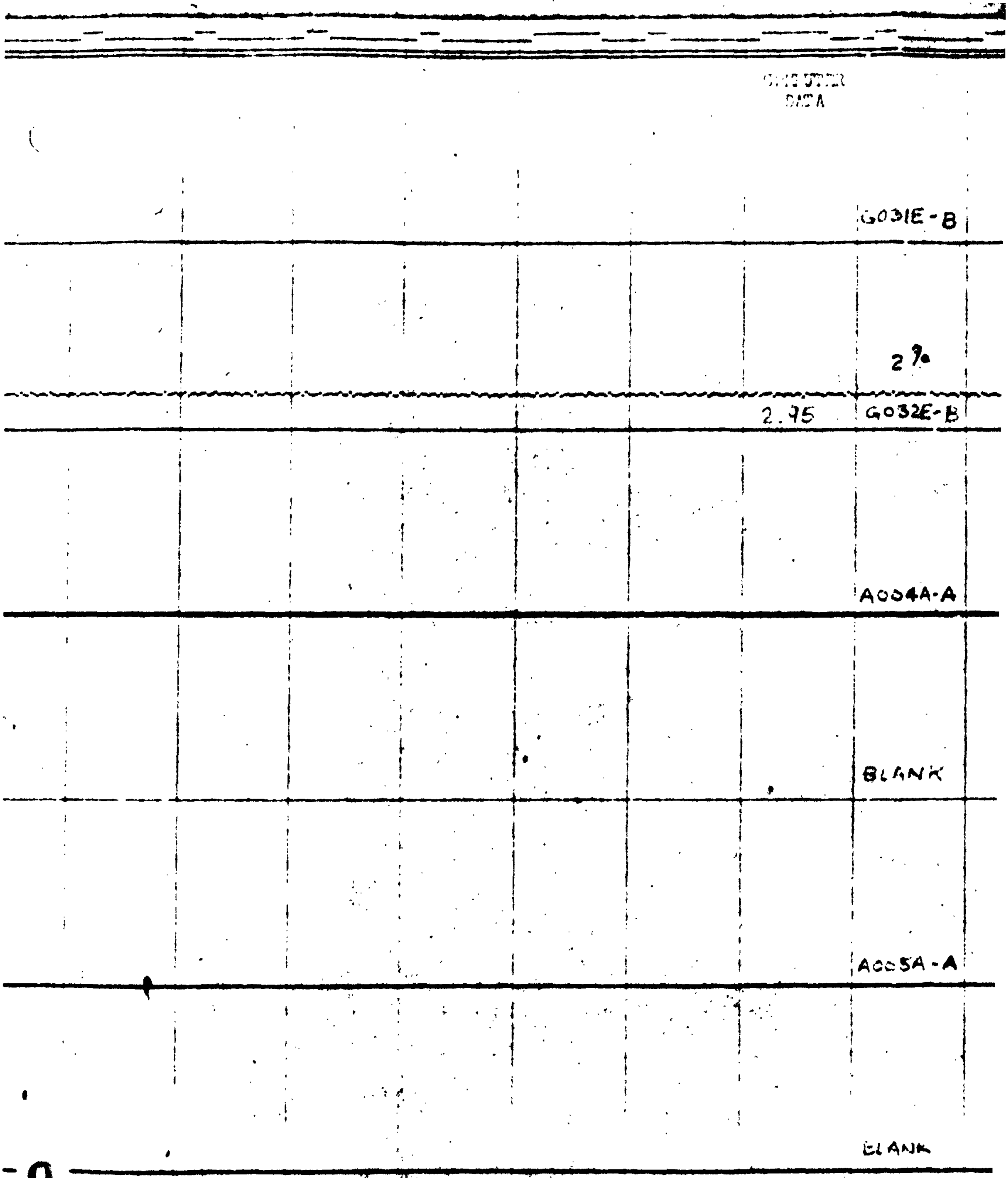

COMPUTED DATA
H007P-B
H008P-B
H009P-B
H010P-B
G091E-B
A063T-A
PLOT 12
T2-2279 VOL 1
PAGE 64

							COMPUTER DATA	
								H011P-B
								H012P-B
								H013P-B
								2 % H014P-B
							4	G092E-B
							2.4	A064T-A
								PLOT 13
[illegible]							T2 2279	VOL I

COMPUTER DATA

1.17	G041E-A
1.15	G040E-D
0.40	G039E-D
1.05	G025E-D
1.35	G027E-D
1.18	G028E-D

PLOT 14



PLOT 15

[illegible] DATA	
1.16	G033E-B
	G035E-B
0.4[illegible]	G037E-B
0.77	1004E-A
0.4	1006E A
1.[illegible]	1008E-A
	PLOT 16
T2-2279	VOL 1
	PAGE 68

COMPUTER DATA

2.79 S013X-B

6%c

11.57 S014X-B

1.47 A040P-A

1.53 A039P-A

1.44 A036P-A

1.52 A037F-A

PLOT 17

.3 F. 2K. TR-279, VOL I

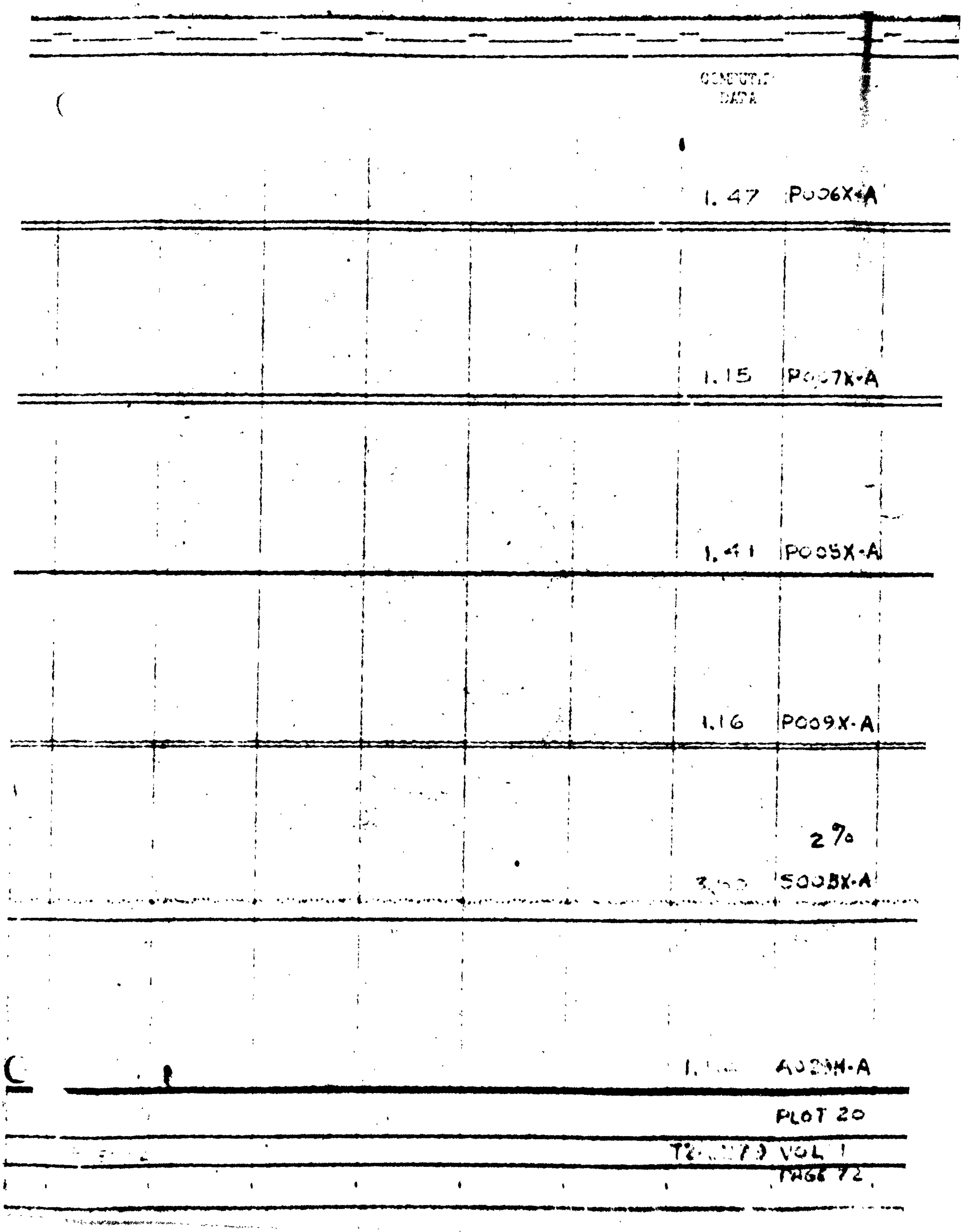
PAGE 64

							COMPUTER DATA	
C							1.50	S012E-A
							1.5[illegible]	S013E-A
							[illegible]	S018E-3
							1.13	1007E-A
							1.15	1005E-A
							0.48	1009E-A
								PLOT 18

12-1279 VOL I
PAGE 70

C

[illegible]	
1.44	S082E-A
1.19	S083E-C
2.10	S085E-C
1.48	S084E-C
	4%
5.43	S086E-C
	D020A
	PLOT 19
7[illegible]-73	VOL I PAGE 71


1.47 P006X-A
1.15
1.41 P005X-A
1.16 P009X-A
2%
S008X-A
PLOT 20
VOL 1
PAGE 72

[illegible]	
1. [illegible]	S002X-A
1.17	F005X-A
	6%
[illegible] 19	P018P-A
0. [illegible]	A014P-A
	+4 -6 R
4. [illegible]	A048T-A
1.16	A024H-A
	PLOT 21

COMPUTED DATA	
1.48	A003H-A
1.93	A050T-C
2% 2.55	A051T-C
1.16	A026H-A
3.3	A0[illegible]T-C
1.[illegible]	A027T-[illegible]

PLOT 3[illegible]

1. [illegible]	A[illegible]5H-A
1.26	AC29P-B
1.26	AC30P-B
1.86	AC31P-B
1.52	A032P-B
2.18	A024T-[illegible]

PLOT 23

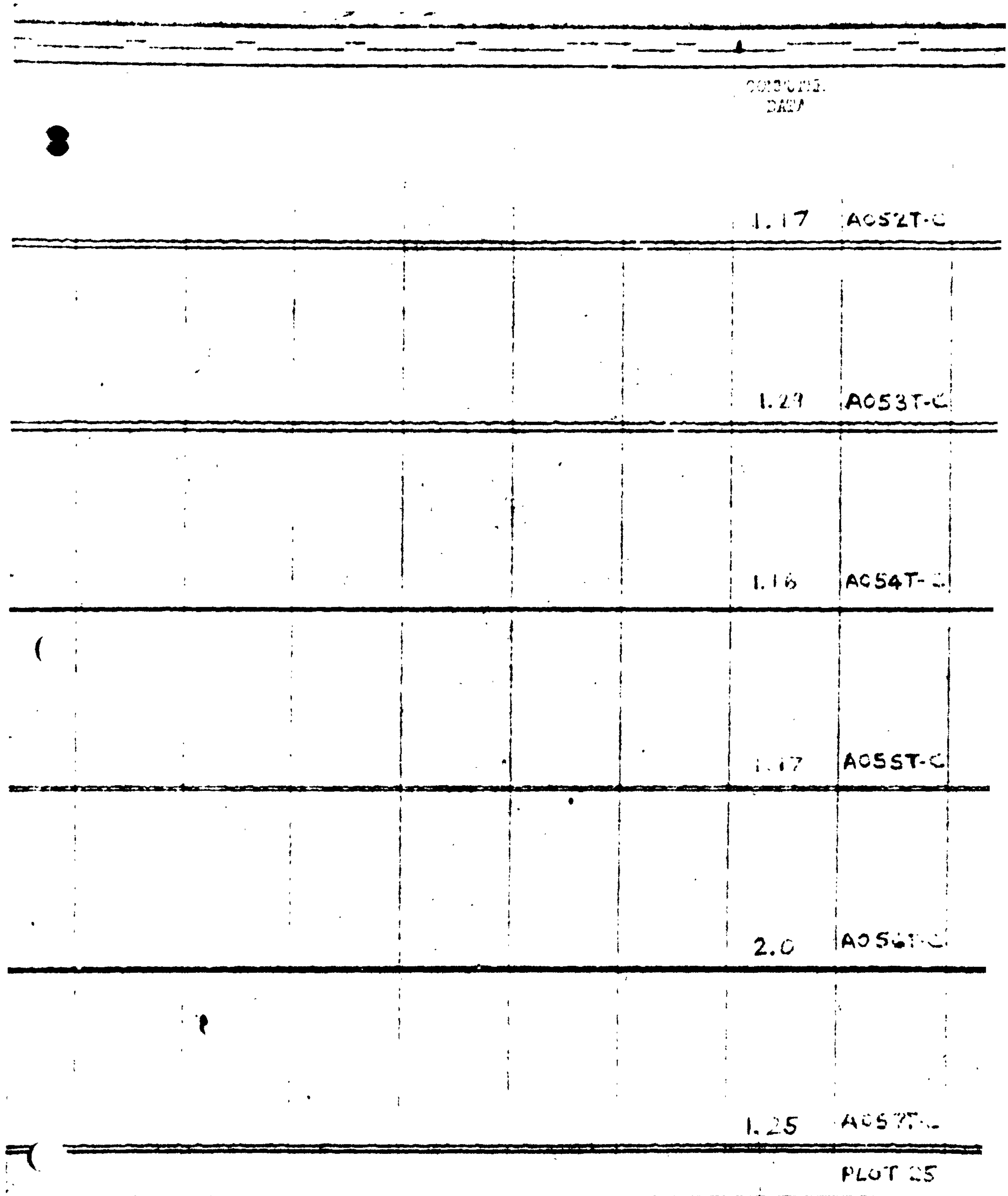
3-30-62

T2-2279 VOL I

PAGE 75

						[illegible] DATA		
						1.45	A010S-C	
						1.51	A011S-C	
						1.16	A012S-C	
						1.49	A009S-C	

			PLOT 24
3-30-62		T2-2279	VOL 1
			PAGE 76


COMPUTED DATA
1.17 A052T-C
A053T-C
1.16
1.17 A055T-C
2.0
1.25
PLOT 25

						3.75	2 % A013T-C	
						12.00	6 ± R A014T-C	
						7.20	4 ± R A016T-C	
						1.19	A017T-C	
						6.40	2 ± R A089T-C	
						5.00	4 + 3 − R A049T-C	

COMPUTER DATA	
1.15	1013E-A
1.16	1012E-A
	1011E-A
0.40	1010E-A
1.53	1015E-A
[illegible]	1014E A

							COMPUTED DATA	
							1.42	A199T-C
							4.20	2 ± R A200T-A
								2%
								A025P-B
								2% A026P-B
								2% A027P-B
								A028P-B
								PLOT 28

								COMPUTER DATA	
								1.00	A005S-C
								1.67	A006S-C
								1.94	A007S-C 2- R
								1.11	A008S-C
								1.50	A090T-A

PLOT 23

COMPUTER DATA

S001X-A

P004X-A

1.18 P016P-A

0.4 A013P-A

2 ±

R

4.[illegible] A038T-C

AC23H-A

PLOT 30

5-30-62

T2-2279 VOL I

PAGE 82

COMPUTED DATA	
.4	A061T-A
1.55	A002H-A
2.50	A040T-C
2.66	2% A041T-C
2.65	2 + R A039T-C
1.17	A071H-A
	PLOT 31
TZ-22.79	VOL I
	PAGE 83

COMBUSTION DATA	
1.18	A044T-C
1.17	A046T-C
1.54	A045T-C
	2 + R
1.46	A047T-C
	3 + R
5.24	A043T-D
2.54	A042T-C

PLOT 32

							COMPUT. DATA	
								2 ± R
							4.45	A011T-C
								2 ± R
							3.60	A012T-C
							1.5	A028H-C
							2.47	A009T-C
								2%
							2.09	A010T-C
								3 + 2 - R
							4.45	A091T-C
								PLOT 33
							T2-2279	VOL 1
								PAGE 35

COMPUTER DATA	
2.67	10[illegible]E-A
1.18	1018E-A
1.27	1017E-A
1.17	1016E-A
1.93	1021E-A
1.18	1020E-A
	PLOT 34

COMPUTER DATA

1.27 A196T-A

1.49 A198T-A

1.36 A021P-B

1.36 A022P-B

1.17 A023P-B

1.19 A024P-B

PLOT 35

3-3-62

T2-22 19 VOL I
PAGE 89

						COMPUTER DATA	
						1.18	A001S-C
						1.81	A002S-C
						1.65	A003S-C
						1.81	A004S-C

PLOT 36

3-30-67 T2-2279 VOL I

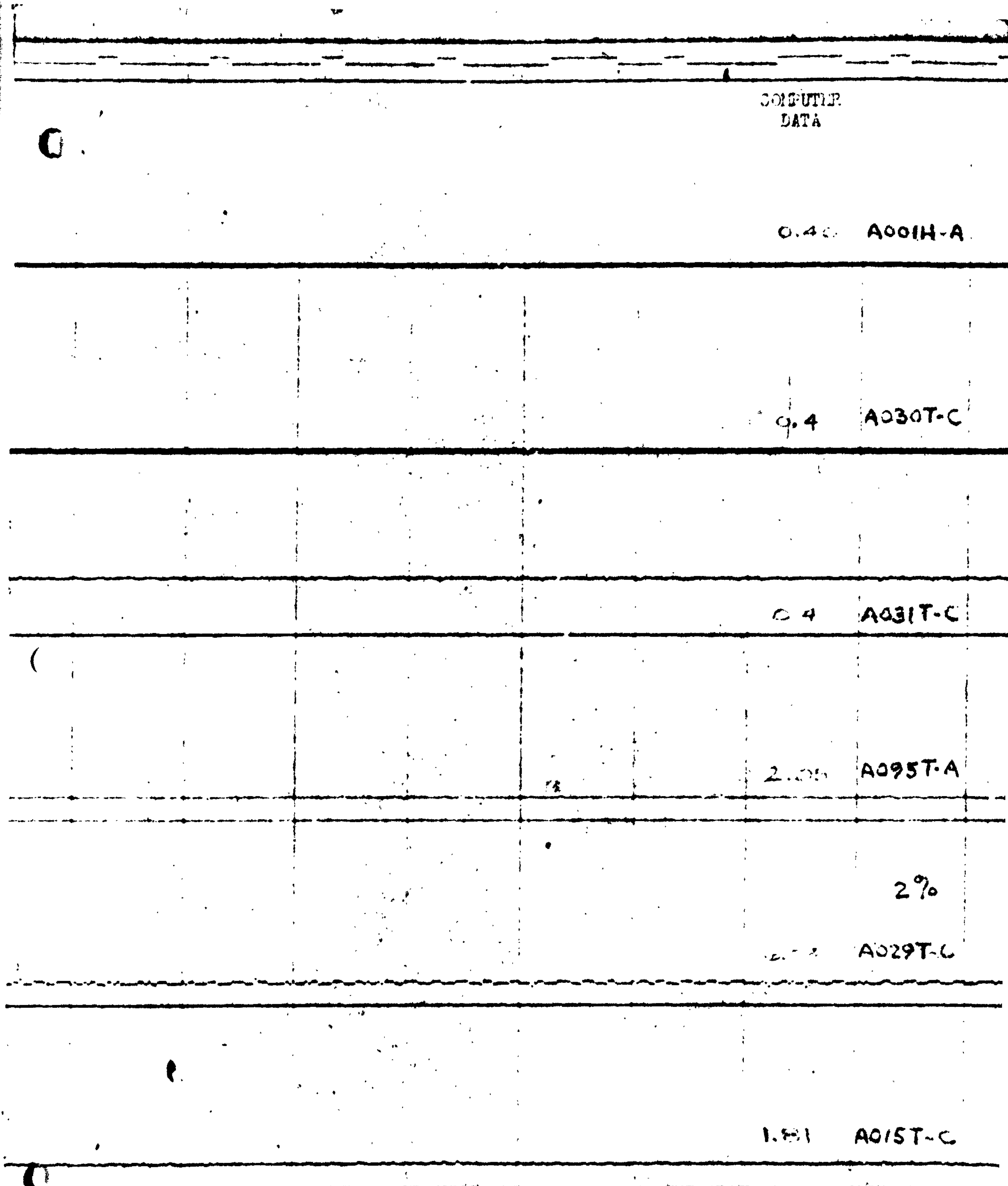
COMPUTER DATA

1.18	P015R-A
0.4	A033P-A
0.4	A034P-A
	2 - R
1.94	A035P-A
	5 ± R
10.43	A028T-C
0.40	A022H-A

PLOT 37

COMPUTER DATA	
1.48	A035T-C
1.16	A037T-C
1.18	A534T-C
[illegible]	A536T-C
5. [illegible] 3 % R	A533T-C
2 % [illegible]	A535T-C

PLOT 38


COMPUTER
DATA
A001H-A
9.4
A030T-C
A031T-C
A095T-A
2%
A029T-C
A015T-C

PLOT 39

COMPUTER DATA

2.90	2 % A027H-A
1.11	2 % A008T-C
3.2	A537T-C
3.20	2 % A505T-C
4.54	3 % A006T-C

PLOT 40

T3-22.79 VOL I

COMPUTER DATA	
1.10	SO21E-A
1.16	SO22E-A
0.40	SO80E-B
0.40	SO81E-B
	3%
	D002E-A
1.49	L001E-A
	PLOT 41
T2-2279	VOL 1
	PAGE 93

APPENDIX III

EQUIPMENT TESTED

EQUIPMENT TO BE TESTED		PART NO.	SERIAL NO.
1.	BAC Power and Cooling Subsystem		
(a)	Instrumentation Power Transfer and Cooling Control Panel	25-18757-802	0001
(b)	Power Status Panel (in BTS-62)	25-17763-14	0001
(c)	BTC-168 for PSCR (part of BTS-36)	25-28104-2	1013
(d)	Battery rack, item 57. Check that batteries are all installed.	Batteries Installed	Installed
(e)	Power Supply Switching Racks (part of BTS-36)	25-14850-4113 25-14850-876	0002 0002
(f)	BTS-36 Power Conversion Racks	25-14850-888 25-14850-886 25-14850-881 25-14850-852 25-14850-885 25-14850-874	0002 0002 0002 0002 0002 0002
(g)	BTS-150 EPCO Subsystem. Record for EPCO drawer.	25-18967-824	0002
(h)	External EPCO Boxes (in the High Bay Area)	25-14878-20 25-14878-20	0005 0006
(i)	Instrumentation Section Cooling Unit	23-5202-820	109
(j)	Equipment Cooling Alarm, item 96	N/A	None
(k)	BTS-62	25-14806-820	0001
(l)	BTS-45	24-2051-1	0001
(m)	Voltage Comparator Power Supply	(Old) 25-14369-3	1024
(n)	Voltage Comparator Power Supply	(New) 25-14369-3	1013

EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
2. Ordnance Subsystem		
(a) Safety Monitor Panel (in BTS-62)	25-17791-59	0003
(b) Ordnance Functional Test Panel (in BTS-62)	25-18622-23	0001
(c) Ordnance Oscillograph (in BTS-62)	25-22260-27	0001
(d) BTS-31	25-14881-150	0003
(e) Safe and Arm Monitor Indicator Panels 3C-LACS-23 (in the High Bay Area)	N/A N/A	None None
3 PCM Subsystem		
(a) BTS-171, for D2CA reset power	25-18648-11	0002
(b) BTS-170, for PCM	25-28103-2	101-12
(c) Control and Indicator Panel (in BTS-17)	25-17782-37	0002
(d) D2CA Converter Programmer	61037-505	A004
(e) SE2A Signal Conditioner	65191-505	A023
(f) 10-20402 Airborne PCM Equipment		
(g) 10-20410 Voltage Regulator	Not Available	
(h) Airborne Patch Panels	Not Available	
(i) BAI-19 Event Mark Units	Not Available	
(j) BAI-9 Matching Units	25-19651-12 25-19649-25 25-19652-12	None None None

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EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
3. (continued)		
(k) BAI-11 T/M VSWR Monitor	10-20460	13
(l) BAI-15 Pressure Transducers	10-20453-3	1404, 1392, 1410, 1411, 1406, 1407, 1408, 1409
(m) BAI-18 Thermocouple System & Reference Junctions (BAI-18) - 6 units	10-20478-5	A102, 101, 103, 104, 105, 110
(n) BTS-162 XDUCER Regulator Power Supply (located in BTS-36)	25-28101-1	29
(o) BAI-2		
(1) RF Section	Not Available	
(2) Multiplexer Programmer	21-50103-68	103-68
(3) Multiplexer Assembly	21-50103-78	103-78
(4) Control Box Assembly	21-50103-38 21-50103-42	103-38 103-42
(5) Auxiliary Box Assembly	21-50103-39 21-50103-40 21-50103-41 21-50103-43 21-50103-44 21-50103-45	103-39 103-40 103-41 103-43 103-44 103-45
(p) PCM Battery (part of BAI-30)	25-25173-4	4014
(q) Strain Transducers	Not Available	

3. (continued)

EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
(r) BAI-24 Antenna Triplexer	10-20409	1015
(s) BAI-25 Power Divider	Not Available	
(t) BAI-40 Calorimeters	Not Available	
(u) BTS-19 T/M Carts (one)	10-20423-30	101
(v) Control Panels for the T/M Carts (in BTS-17)	10-20423-	201
(w) BTS-17 (two racks)	25-14884-31 25-14884-31	0002
(x) BTS-19 Digital Voltmeter and Digital Printer (in BTS-17)	10-20423-32 29-16457-1	#155343 0102
(y) BTS-163, for the T/M Calibration Carts	25-38103-3	101-7
(z) BAI-44 Differential Pressure Transducers	Not Available	
(aa) BTS-152	25-14860-801	0001
(bb) BTS-152 Digital Voltmeter & Digital Printer	10-20423-32 10-20423-32	103 101
(cc) Ablation Gauge Power Supply	29-18014-1	0006

EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
4. FM/FM Subsystem		
(a) BAI-7 FM/FM T/M Equipment (two)	10-20403-4	508
	10-20403-6	505
(b) BAI-10 Test and Calibrate Transfer Switch	10-20420-1	071
(c) BAI-12 AC Signal Conditioning Amplifiers (four)	Not Available	
(d) BAI-13 DC Signal Conditioning Amplifiers (six)	10-20459-2	145
	10-20459-2	146
	10-20459-2	149
	10-20459-2	171
	10-20459-2	162
	10-20459-2	A148
(e) BTS-162, for FM/FM No. 1	25-28101-1	0019
(f) BTS-162, for FM/FM No. 2	25-28101-1	0037
(g) BAI-8 Linear Accelerometer	10-20454-3	10679
	10-20454-4	10933
	10-20454-4	10937
(h) BAI-14 Vibration Transducers	Not Available	
(i) BAI-20 Staging Switch	10-20476	102
(j) BAI-42 Angular Accelerometer	28550-507-31	A009A

EQUIPMENT TO BE TESTED		PART NUMBER	SERIAL NO.
5.	Amusa Subsystem		
	(a) BTS-108 (Left hand rack)	25-14813-71	[illegible]7
	(b) Convair 26-14 Rack in BTS-108	26-20801-3	[illegible]
	(c) Amusa Transfer Relay	26-20216-3	52
	(d) BAI-4 Radio Tracking Equipment	26-12002-801	026-0059
	(e) VSWR Monitor Transducer	10-20460	13
6.	Command Destruct Subsystem		
	(a) BTS-106	25-14824-55	0004
	(b) BAI-3 Command Destruct Receivers (two)	10-20428-2 10-20428-2	51 64
	(c) BAI-38 Premature Separation Switch & Timer	Not Installed	
	(d) BTS-161 DC Power for Destruct "A"	25-28103-4	101-3
	(e) BTS-163 DC Power for Destruct "B"	25-28103-4	1[illegible]1-24
	(f) Command Destruct Power Transfer Switch	10-20420-2	[illegible]
	(g) BAI-29 Command Destruct Receiver A Battery	25-25173-4	[illegible]
	(h) Command Destruct Receiver B Battery	25-15799-23	N/A
	(i) Premature Separation Batteries (2) BAI-28	25-17837-47 25-17837-45	N/A N/A
	(j) BAI-33 Command Antenna Filter/Divider	Not Available	

EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
7. G&C Subsystem		
(a) NP-10 System	40249-106-11	AC040
(b) C23A	15148-10	10450-2-11
(c) C19A	57000-305-11	A002
(d) BTS-163, for C19A	25-28104-2	1029
(e) 400 cycle converter for C19A	174652687A	15GH-588
(f) BTS-164, for 1st and 2nd NCU Hydraulics	25-23824-1	204108
(g) BTS-169, for 1st and 2nd NCU Electronics	25-28104-3	1011
(h) BTS-165, for 3rd NCU Hydraulics	25-28105-1	15
(i) BTS-168, for G&C Electronics	25-28104-1	1003
8. Support Subsystem		
(a) RCA Time Terminal (in MAB 2) item 34	EM 60-10	81
(b) GHEDA Terminal (in MAB 2) item 35	57753	S/N 10 S/N 12
(c) MDPS, item 32	None	305
(d) BTS-74	25-14890-33	0002
(e) BTS-14 (in T/M Room)	25-14895	0001
(f) RCA Time Terminal (in T/M Room)	EM 60-10	6
(g) P.A. System Rack, item 33	Not Available	

EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
9. Facilities Subsystem		
(a) Lights in MAB 2		
(b) Air Conditioner for MAB 2	50K16B229	8C71733
(c) Air Conditioner for the Electronic Equipment in MAB 2	39AC80909-1 -2	940368
(d) Air Compressor for MAB 2		
(e) 400 cycle motor generator for C19 and CMCP, item 110	14652687A	15GH-588
(f) Line Voltage Regulators GE31D5004A, items 102, 103, 104	GE31D5004-G0 GE31D5004-G1 GE31D5004-G2	156247 156246 156248
10. PCM/FM Ground Station		
(a) BTS-11 PCM/FM Acquisition System	25-14312-808	0001
(b) BTS-143 PCM/FM Acquisition System	25-14313-806	0001
(c) BTS-146 PCM Raster Display System	10-20407-5	0001
(d) BTS-137 Serial Tape Recorder/Reproducer (two used with BTS-11)	25-14317-800 Not Used	142
(e) BTS-137 Serial Tape Recorder/Reproducer (used with BTS-143)	25-14317-800	141

	EQUIPMENT TO BE TESTED	PART NO.	SERIAL NO.
11.	FM/FM Ground Station		
	(a) BTS-9 PAM/FM/FM Telemetry Data Acquisition Station No. 1	25-14304-813	103
	(b) BTS-9 PAM/FM/FM Telemetry Data Acquisition Station No. 2	25-14304-813	102
12	Quick-Look Subsystem		
	(a) BTS-12 PCM Quick-Look System	25-14314-824	0001
	(b) BTS-136 PCM Format Converter	25-14316-812	0001
	(c) BTS-137 Serial Tape Recorder/Reproducer (used with BTS-136)	25-14317-800	107
	(d) BTS-137 Serial Tape Recorder/Reproducer (used with BTS-12)	25-14317-800	126

TABLE IV

TEST EQUIPMENT USED

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STANDARD AND SPECIAL TEST EQUIPMENT REQUIRED	PART NO.	SERIAL NO.
1. One 25-23567 Ground Power Supply Oscillograph Rack (PRRS462)	25-23567-803	3002
2. One Consolidated Electrodynamics Corporation (CEC) recording oscillograph type 5-119P4-36V or equivalent CEC oscillograph. (installed in 25-23567)	5-119P4-36V	19062
3. List of galvanometers and parts required for the CEC oscillograph.		
(a) Eleven galvanometers type 7-363		
(b) Twelve galvanometers type 7-362		
(c) One galvanometer type 7-002		
(d) Resistors (all are 1 watt 5% resistors) Two 200 ohm One 12K ohm One 11000 ohm		
(e) One push button switch momentary ON		
(f) One six(6) volt battery		
(g) Six Zener diodes type International Rectifier Corporation 10EZ5.6T10		
(h) Six single banana plugs		
(i) Four Cannon plugs XLR3-11C		
(j) 300 feet of 2 conductor shielded wire BMS13-5D, type III, class 2 #1[illegible]		
(k) Eight 25-23585-3 Galvo Matching Box Modules		
(l) Nine 25-23585-5 (preferable) or 25-23586-1 Galvo Matching Box Modules		
(m) Spare magazine loaded with paper.		
4. One Variable DC Power Supply	HTR 28-5	C/C 155239
5. One Hewlett Packard DC Voltmeter Model 412A	412A	C/C 117202
6. One Direct Writing Oscillograph, Brush Mark II (RD 252160) or equivalent	RD 252160	No S/N
7. Two Ballantine 305A peak to peak reading VTVMs	MOD 305A MOD 305A	1920 1915

STANDARD AND SPECIAL TEST EQUIPMENT REQUIRED

	Item	PART NO.	SERIAL NO.
8.	One Tektronix Oscilloscope with a sweep rate up to 10mc. It shall have differential plug in amplifiers type D, type E, and type G.	MOD 535 TYPE D TYPE E TYPE G	2330 012490 003516 005411
9.	Isolation Transformers with Faraday Shields:		
	(a) One 1000 VA transformers (for Tektronix scopes if needed)	N59M	C/C 118660
	(b) Tow 500 VA transformers (for Ballantines 305As)	N57M N57M	C/C 18665 C/C 118667
10.	One Hewlett Packard Audio Oscillator Model 200AB.	MOD 200AB	008-11182
11.	Three Power Line Transient Probes. (Genistron Number GWF 10192), PTR 83028	GWF 10192 GWF 10192 GWF 10192	None None None
12	The following Ordnance Test Boxes will be required		
	(a) Three Ignition Test Boxes (25-23808)	25-23808-1 25-23808-1 25-23808-1	0002 0001 0004
	(b) Two Stage Separation Test Boxes (25-23806)	25-23806-1 25-23806-1	0004 0002
	(c) One Thrust Termination Test Box (25-23807)	25-23807-1	0002
	(d) Three Destruct Test Boxes (25-23805)	25-23805-1 25-23805-1 25-23805-1	0002 0001 0006

STANDARD AND SPECIAL TEST EQUIPMENT REQUIRED		PART NO.	SERIAL NO.
13.	The following simulated squibs will be required.		
	(a) Two second stage ignition simulated squibs 1S3A2	1S3A2 1S3A2	N/A N/A
	(b) Two third stage ignition simulated squibs 1S207A0	1S207A0 1S207A0	N/A N/A
	(c) Two 1-2 stage separation simulated squibs 1S3A2	1S3A2 1S3A2	N/A N/A
	(d) Two 2-3 stage separation simulated squibs 1S3A2	1S3A2 1S3A2	N/A N/A
	(e) Four thrust termination simulated squibs 1S45A1	1S45A1 1S45A1 1S45A1 1S45A1	N/A N/A N/A N/A
14.	One six channel Brush oscillograph or equivalent For Destruct Current meas.	RD1662-20	C/C 156344
15.	One AVCO R/V simulator SKT-319	SKT-319	N/A
16.	Two cooling squib jumper plugs (25-18624)	25-18624	N/A
17.	BTS-152 tapes as follows: One each D2-7237-2A (Ambient tape)	D2-7237-2A	
	One each D2-7237-2C (Calib. tape)	D2-7237-2C	
18.	One receptacle Bendix part number PC01E-16-8P(SR) or BP00CP-16-8P	BP00CP-16-8P	N/A